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Investor Sentiment in the Stock Market

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INVESTOR SENTIMENT IN THE STOCK MARKET

A Thesis

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Annem Gülsüm ve babam Murat'a ithafen…

(To my parents, Gulsum and Murat…)

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LIST OF ABBREVIATIONS

BF	Behavioral Finance
B/M	Book-to-market
CAPM	Capital Asset Pricing Model
DFA	Dimensional Fund Advisors
E/P	Earnings-to-price
EMH	Efficient Market Hypothesis
LHS	Left Hand Side
N	Sample Size
RHS	Right Hand Side

ABSTRACT

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Classical finance theories neglect the impact of investor sentiment on stock returns. These theories assume that investors are rational and make decisions in a way that maximizes their wealth. However, a vast amount of research shows that investors' decisions are affected by their psychological biases and feelings. These findings suggest that investor sentiment may have an impact on stock returns. This hypothesis is the main motivation of this study. First, this study examines whether there is correlation among investor sentiment indicators, and whether sentiment indicators have an impact on stock returns in the US and other countries. Second, this study investigates whether a global sentiment exists in developed and emerging countries. Additionally, it examines the relationship between investor sentiment and anomalies. Finally, this study investigates a method that helps investors use sentiment information during trading process.

The results of this study suggest that there is correlation among sentiment indicators in the US. In addition to this, several US investment indicators have a significant relationship with the S&P 500 index. Similar findings are found in Japan, Germany, China and Turkey. Moreover, this study finds that local (country) sentiment indicators are significantly correlated. It seems there is a global sentiment which impacts many countries. This global sentiment is stronger in the years between 2008 and 2012 than in the years between 1985 and 1990 due to increased economic ties among countries. Additionally, countries' stock market indices are significantly

correlated. Furthermore, this study suggests that size, book-to-market and momentum anomalies can be explained by investor sentiment. Finally, the last chapter of this study proposes a sentiment rating system for individual stocks. In this system, stocks are assigned to different rating groups based on their sensitivity to sentiment changes. For example, a stock with very limited susceptibility to sentiment changes has AAA rating. An AAA rating means that a particular stock is not affected by sentiment driven mispricing and unexpected macroeconomic news. Therefore, the rating information can be used by individual investors to understand stock' behavior under sentiment changes. In addition, it is found that stock groups, which have negative correlation with sentiment changes, may have differences in terms of risk and size.

CHAPTER 1. INTRODUCTION

1.1 Motivation

The Classical Financial Theory is not as popular as it was 30 years ago. Market efficiency, rationality of people, and unlimited arbitrage opportunities are important components of the Classical Financial Theory that have been questioned for many years. The researchers have found a vast amount of evidence which states that the markets are not efficient, that people are not rational and that arbitrage opportunities are limited. There is no place for investor sentiment in the Classical Finance Theory; however, these new developments in finance indicate that investor sentiment may actually have impact on stocks. Therefore, investor sentiment must be investigated to understand whether a significant relationship exists between sentiment and stocks.

In the past, investors who believed in market efficiency thought that the only way of beating the market was to take more risk. Nevertheless, everything changed, when Basu (1977) found that stocks' earnings to price (E/P) ratio and risk adjusted stock returns have a relationship. After that, several researchers produced additional findings against market efficiency. For instance, Banz (1981) discovered that, on average, small stocks have more risk adjusted returns than large stocks. The momentum effect (Jegadeesh & Titman, 1993), contrarian effect (DeBondt & Thaler, 1985), and January effect ((Keim, 1983), (Reinganum, 1983)) are a few of other examples. Since all of these effects are deviations from market efficiency, they have categorized as anomalies. Interestingly,the profitability of size and the value effects vanished following the related papers' releases (Schwert, 2003). Currently, investors are looking for new ways of beating the market without taking more risk. The motivation of this study is to

determine whether information regarding investor sentiment can be used in order to beat the market.

Baker & Wurgler (2006) stated that the returns of stocks with specific characteristics are more inclined to sentiment changes. They found that size, age, volatility, profitability, dividend payment, growth, and being distress have impact an on the stocks' sensitivity to sentiment changes. For example, Baker & Wurgler (2006) found that young stocks and small stocks are more inclined to sentiment changes. Even though these findings are helpful for investors, one cannot easily evaluate a stock since he or she needs to consider the above seven parameters. In order to make this evaluation easier, a simple model determining individual stocks' sensitivities to sentiment changes can be used. By doing so, investors can understand the behavior of an individual stock and use this rating information to assist them in picking stocks.

While the reasons behind stock anomalies have not been identified in the broader literature, several researchers claim that behavioral and psychological reasons might be reasons behind anomalies. If investor sentiment is the reflection of expected behaviors, then the impact of investor sentiment on anomalies can be statistically examined by using sentiment as an explanatory factor.

1.2 Research Questions

Classical Finance Theory, which is based on the Efficient Market Hypothesis, has been questioned for many years. Its assumptions regarding the rationality of people, unlimited arbitrage opportunities are not supported by current research. This new evidence produced a novel area in finance which considers human psychology as a predictor of market changes. Behavioral Finance tries to explain the changes in the market by considering human psychology and irrationality.

In this context, behavioral finance and investor sentiment is quite related. In a better explanation, investor sentiment is a topic of behavioral finance, and it can be defined as investors' expectations and feelings about the market. Investor sentiment

studies include not only sentiment and financial market relationship but also researches on the formation of sentiment and factors affecting it.

In this study, the impact of sentiment on stock returns has the priority. The research questions are below.

Research Question 1: Are there any significant relationships among indices?

Fisher & Statman (2003) stated that the University of Michigan consumer sentiment index and the Conference Board consumer confidence index are correlated. I wonder whether there is correlation among other sentiment indicators, especially between institutional and individual investor sentiment indicators.

Research Question 2: Are several confidence indices good at predicting stock returns?

Every investor looks for ways of predicting the stock market. Some use asset pricing model, some use multiples and some use the vast amount of market indicators to succeed in predicting the market. Investor sentiment indicators may be a good market predictor since they reflect the expectations of investors. This study investigates the relationship between sentiment indicators and stock market returns.

Research Question 3: Is there any evidence in other countries?

Several studies ((Fisher & Statman, 2003), (Baker & Wurgler, 2006), (Brown & Cliff, 2005) and (Lemmon & Portniaguina, 2006)) showed that sentiment has impact on stock returns in the US stock market. I wonder whether this relationship exists in other countries.

Research Question 4: Is Sentiment Global?

Strong economic ties connect countries together. When there is a recession in one market, others are also affected because investors are able to invest in securities traded in other countries. These economic ties and investing internationally may introduce common sentiment that is effective all over the world. This study investigates the existence of such sentiment.

Research Question 5: Does sentiment explain anomalies?

The Classical Finance Theory is not able to explain anomalies. Limits to arbitrage and psychology of investors are considered reasons for possible reasons. Since investor sentiment is related to the psychology of investors, it may also be a reason for anomalies.

Research Question 6: How can investors effectively use sentiment information during trading process?

It is known that sentiment has impact on stock returns. However, its impact is not the same for all stocks. Baker & Wurgler (2006) stated seven stock characteristics have a role in determining sentiment sensitivity. Therefore, an average investor cannot assess a stock's sentiment sensitivity easily. I wonder whether a publicized classification of stocks based on sentiment sensitivities can help investors use sentiment information.

1.3 Overview of Chapters

Chapter 2 is designed as an introduction to behavioral finance. At first, market efficiency and its assumptions are presented. Then evidence in favor of and against market efficiency is presented. At this point, anomalies, which are deviations from market efficiency, are defined. After that, behavioral finance, which is introduced as an

explanation to anomalies, is explained with its two components: limits to arbitrage and psychology.

Chapter 3 presents the direct and indirect sentiment indicators. Graphics illustrate the relationship between the S&P 500 index and sentiment indicators. Then, it shares the correlation among sentiment indicators.

Chapter 4 examines the relationship between sentiment indicators and stock returns. First, the relationship between the S&P 500 index and sentiment indicators is analyzed; then, the same relationship is searched in other countries. In addition to this analysis, relationships among countries' sentiment indicators are examined. Chapter 4 also questions whether size and industry are proxies for stocks' sensitivities to sentiment changes. In other words, it questions whether the impact of sentiment is similar on all size and industry portfolios.

Chapter 5 answers whether sentiment can explain anomalies.

Chapter 6 measures the sensitivity level of individual stocks to the sentiment changes, and classifies stocks based on their inclination to sentiment changes. Stocks in different groups are assigned to ratings, and then rating information is used while picking stocks.

Chapter 7 concludes the study and shares suggestions for future works.

CHAPTER 2. INTRODUCTION TO BEHAVIORAL FINANCE

The Efficient Market Hypothesis (EMH) claims that the only way of beating the market or earning more return is taking more risk. According to EMH, all information about stocks is available for everyone, and prices reflect the new information as soon as it is released.

However, the vast amount of research showed there are strategies that can beat the market without taking more risk. In other words, the classical asset pricing models are not able to explain these strategies. These strategies (deviations from asset pricing models) are called anomalies.

The research findings against the EMH introduced Behavioral Finance which considers human psychology while explaining price movements in the financial markets. According to Behavioral Finance studies, investors may have several biases such as overconfidence, endowment, and self-attribution that may lead them toward bad decisions. In addition to the above, Behavioral Finance literature claims that anomalies exist because of behavioral biases.

In this chapter, the Efficient Market Hypothesis will be presented along with its assumptions and different types (weak, semi-strong and strong). Evidences for and against the EMH will be examined in section 2.1. Anomalies will be explained in section 2.2 with their possible reasons for existing. The last section introduces Behavioral Finance as a contrary to the Efficient Market Hypothesis and an explanation to anomalies.

2.1 Market Efficiency

Market efficiency has been a very popular research subject since Fama's (1970) paper. Fama (1970) stated that in efficient markets prices indicate all accessible

information and new information will be priced very fast. In other words, over or under valuations should not exist for a long time.

In Fama's (1970) paper, the market efficiency was presented within three different forms as weak, semi-strong and strong. The weak form efficiency indicates that prices display all information about historical prices. The semi-strong form indicates that prices display all information about historical prices plus publicly available information. The strong form indicates that prices display private information as well.

There are several evidences in favor of market efficiency. The first one is that mutual funds do not beat the market persistently (Malkiel, 1995) . With this evidence, one may assert that all information available to everyone and the only way to make higher return is to take more risk. Therefore, persistency cannot be achieved.

There is much more evidence against market efficiency than in favor of market efficiency. The evidence against market efficiency can be classified into three groups as information efficiency, efficiency forms, and anomalies.

Grossman & Stiglitz (1980) claimed that investors who spend their resources to have more information earn more return, and since collecting information is not free, the markets cannot be efficient in terms of information.

In the literature, there are evidences against all forms of efficiency. According to weak form, strategies using historical prices should not work. Nevertheless, momentum strategy shared by Jegadeesh & Titman (1993) does not support this form. One may assert that strategies using income statement or balance sheet should not help investors make more profit according to semi-strong form efficiency. Nonetheless, Basu (1977) argued that earnings to price (E/P) ratio and risk adjusted stock returns are related to each other. The strong form argues that insider trading should not provide extra profit. However, there is evidence that insider trading helps to have more profit (Seyhun, 1986).

If there is market efficiency, strategies based on under-reaction and over-reaction should not consistently work in the market. However, the momentum effect, (Jegadeesh & Titman, 1993), which is the result of underreaction, and contrarian effect

(DeBondt & Thaler, 1985), which is the result of overreaction, have been working in the market. There are other strategies such as size effect (Banz, 1981) and January effect ((Keim, 1983), (Reinganum, 1983)) which are evidence against market efficiency.

Deciding on whether market efficiency exists is a quite complicated process. To decide on that, one needs to know the right prices of stocks. Researchers are using asset models such as Capital Asset Pricing Model (CAPM) ((Sharpe, 1964), (Lintner, 1965), (F Black, 1972)) to assess the right price. However, the price found by using CAPM may not be the right price. In other words, when deviations from the asset pricing models are found, it may indicate that there is evidence against market efficiency or that the model has a problem. Therefore, it is very difficult to know which one is right. This issue was termed as Joint Hypothesis Problem in the literature (Fama, 1991).

2.2 Anomalies

The vast amount of research found several trading strategies help to earn more return without taking more risk. These strategies, which are deviations from market efficiency, are called anomalies. The most well-known anomalies are size, book-to-market, momentum, and reversal anomalies.

Banz (1981) showed that on average, stocks with small market capitalization gain more risk adjusted return than large stocks on average. After his paper, this finding was termed as size effect, and it became very popular. In a special issue, the Journal of Financial Economics published seven papers covering size effect (Schwert, 1983). Apart from academics, financial companies were excited about the size effect. For example, Dimensional Fund Advisors (DFA) started to use size effect as a strategy (Schwert, 2003). However, it is interesting that the size effect was not in the market after 1982 (Schwert, 2003).

The second deviation form market efficiency is value effect. Basu (1977) found relationship between earnings to price (E/P) ratios and risk adjusted stock returns. In addition, book-to-market ratios and stock returns are positively correlated in the US

market (Fama & French (1992)). Other than the US market, a similar relationship is found in the Japanese stock market (Chan, Hamao, & Lakonishok, 1991). However, this relationship is not able to be explained by the asset-pricing model of Sharpe (1964), Lintner (1965) and Black (1972). According to Fama & French (1992), stocks with higher book-to-market ratios outperform stocks with lower book-to-market ratios even though there is no significant risk difference; thus producing the term book-to-market anomaly.

Momentum effect is another deviation from market efficiency. Jegadeesh & Titman (1993) formed a portfolio by picking stocks that had a great performance in the past three months to one year (-12, -3). Then, they formed another portfolio by picking stocks that had worst performance in the same time period. After that they bought the winning portfolio and sold the losing portfolio. Finally, they found that this strategy provide positive returns in the next three months to one year (3, 12). Jegadeesh & Titman (1993) stated momentum is not related to the riskiness of stocks. In addition, macroeconomic factors are not able to explain momentum, and it exists in many other countries (Griffin, Ji, & Martin, 2003).

DeBondt & Thaler (1985) ranked stocks based on their past three years' results and formed two portfolios; one consists of winners and the other consists of losers. They stated that losers beat the winners in the next three years. After this paper, authors published another paper for further evidence. DeBondt & Thaler (1987) picked the best and the worst 50 stocks to form two portfolios based on stocks' previous five year performances and they found the portfolio of worst stocks beat the portfolio of best stocks in the next five years. Reversal (contrarian) strategy suggests buying the outperforming portfolio and selling the underperforming portfolio. DeBondt & Thaler (1985) stated this reversal is due to overreaction of investors. As mentioned earlier, according to the EMH, information should be priced correctly and swiftly. Because of this reason, reversals (contrarian) strategy is called an anomaly.

Other than size, value, momentum and reversal effects, the literature presents several more anomalies such as January effect ((Keim, 1983), (Reinganum, 1983)) and asset growth (Cooper et al., 2008). In different papers, Keim (1983) and Reinganum

(1983) found small stocks earn more return in January than other months. Cooper et al. (2008) stated portfolios with low asset growth beat the portfolios with high asset growth.

As mentioned earlier, market efficiency is inadequate to explain anomalies. The existence of anomalies is explained by behavioral biases and under/overreaction. For example, reversal anomaly exists due to overreaction of investors (De Bondt & Thaler, 1985b). Jegadeesh & Titman (1993) stated momentum anomaly exists because of under-reaction of investors to information about firms.

Even though the impact of some anomalies vanished after the introduction of them (Schwert, 2003), the strong findings about anomalies mitigated the power of the Classical Finance Theory. Market efficiency, which is the most important assumption of Classical Finance Theory, does not make sense anymore. In addition, research on cognitive science weakened Classical Finance Theory's second assumption; rationality of people. The vast amount of researchers showed that people are not rational and that have a variety of behavioral biases. The research on these two assumptions unveiled a new area - behavioral finance.

2.3 Behavioral Finance

According to Behavioral Finance, financial models should assume some investors are not rational (Barberis & Thaler, 2003). Behavioral Finance generally works on two topics: the limits the arbitrage and psychology.

2.3.1 The Limits of Arbitrage

According to the Efficient Market Hypothesis, the price of a security is the same as the security's fundamental value, which is today's value of all future cash flows of the security. In this sense, it is thought that if there is a deviation from the right price, it will disappear with the help of arbitrageurs (Barberis & Thaler, 2003).

Arbitrage opportunity can be defined as a situation in which an investor can make profit without taking any risk (Bodie, Kane, & Marcus, 2009). However, Barberis & Thaler (2003) stated that arbitrage opportunities may be expensive and dangerous due to fundamental risk, noise trader risk, and implementation costs.

While arbitrageurs try to take advantage of mispricing, negative news related to a security may disable arbitrageurs to make profit. This kind of risk is defined as fundamental risk (Barberis & Thaler, 2003).

Noise is the opposite of information, and noise trading is not the way of earning positive returns (Fisher Black, 1986). Noise trader risk may lead arbitrageurs to stay liquated so that opportunities cannot be exploited (Shleifer & Vishny, 1997).

Transaction costs discourage investors to take advantage of arbitrage opportunities (Barberis & Thaler, 2003). Also, selling short is prohibited for mutual funds (Barberis & Thaler, 2003) so that implementing an arbitrage opportunity may be quite risky in some cases.

2.3.2 Psychology

The previous section showed that limits to arbitrage seem to be a good reason for the existence of anomalies. Rational investors are not able to fix mispricing due to the risk and cost of arbitraging. Sometimes these deviations (mispricing) from the fundamental prices result from investors' biases. Cognitive psychologists presented several biases that may have impact on the trading process by running a vast amount of experiments. Overconfidence, framing, mental accounting, availability, conservatism, endowment, ambiguity aversion, and loss aversion are examples of these biases that presented in this section.

2.3.2.1 Overconfidence

An overconfident investor may undermine the new information against his or her judgment so that the investor may make bad trading decisions. Svenson (1981) asked people to evaluate their driving abilities in Sweden. The answers were surprising:

77% of survey participants considered themselves above the average. The result suggests that people have a tendency to exacerbate their abilities.

Frequent trading mitigates the return of investors (Barber & Odean, 2000), and since overconfident investors trade more (Odean, 1998), overconfidence bias has another negative effect other than making bad decisions.

2.3.2.2 Framing

People's decisions vary under different framings (Tversky & Kahneman, 1981). It may be because people change their behavior when they are faced with the probability of loss (Kahneman & Tversky, 1979). According to these authors, Prospect Theory, which states that risk loving behavior appears if there is loss in the framing, may be an explanation for this bias.

2.3.2.3 Mental Accounting

Benefits and costs of different things are not evaluated in the same account and some expenses can be more important to people (Thaler, 1999). For instance, people may visit a store very close to them in order to have a $10 discount for food but not for a $10 discount for a movie theatre ticket. Such behavior is termed as mental accounting.

2.3.2.4 Availability

Availability is a bias that leads people to use the information they have at the moment of decision making (Tversky & Kahneman, 1974). For example, if someone is asked if lightening kills more people in the United States or if tornados do, he or she may select tornados due to broad media coverage of tornado deaths despite lightening being the correct answer (Pompian, 2006).

2.3.2.5 Conservatism

Conservatism bias is the tendency to keep the previous position while there is new information against the previous position; thus, this bias may help momentum strategies (Bodie et al., 2009).

2.3.2.6 Endowment Effect

While selling things, people may ask for more money than the fundamental value (Thaler, 1980). In the literature, it is called an endowment effect.

2.3.2.7 Ambiguity Aversion

While deciding on an option, people select the one with its components' probabilities are known (Ellsberg, 1961). This fact is termed as ambiguity aversion in literature.

2.3.2.8 Loss Aversion

Loss aversion can be defined as paying more attention to not losing anything than winning something (Tversky & Kahneman, 1991).

2.4 Conclusion

The vast amount of findings against Market Efficiency and the Classical Finance Theory introduced Behavioral Finance. The new theory of finance assumes that some investors are irrational (Barberis & Thaler, 2003). Research on limits of arbitrage, especially on noise traders, and psychological biases supported this assumption.

Behavioral Finance attempts to explain anomalies and the role of psychology in these anomalies. It does this with two research components: limits of arbitrage and psychological biases.

The research on limits of arbitrage help explain mispricing. Fundamental risk, noise trader risk, and the cost of implementing arbitrage strategies indicate that removing mispricing is not easy or cheap.

According to Behavioral Finance, mispricing results from irrational investors. The psychology component of Behavioral Finance shows that biases lead investors towards bad decisions resulting in mispricing. For example, conservatism bias may help momentum strategies (Bodie et al., 2009). Similar examples are available in the related literature.

With its two components, limits to arbitrage and psychology, Behavioral Finance attempts to explain anomalies that cannot be explained by the Classical Finance Theory. Considering the evidence, Behavioral Finance has made a substantial progress in explaining anomalies previously overlooked.

CHAPTER 3. WHAT IS INVESTOR SENTIMENT?

Investor sentiment can be defined as the expectations and feelings of investors about market conditions. For several decades, it has been believed that investor sentiment has an impact on stock returns.

The Classical Finance Theory assumes that people are rational and make the decision to maximize outcome. In this theory, there is no place for sentiment because people's feelings and expectations about the market do not impact stocks. However, Behavioral Finance is quite related to investor sentiment since the psychology of investors is another topic of Behavioral Finance.

In this section, several sentiment indicators will be presented and the relationship among these indicators will be examined.

3.1 Investor Sentiment Indicators

There are various indicators in the US market which measure the sentiment by using different methods. In this study, sentiment indicators are classified into two groups: direct and indirect.

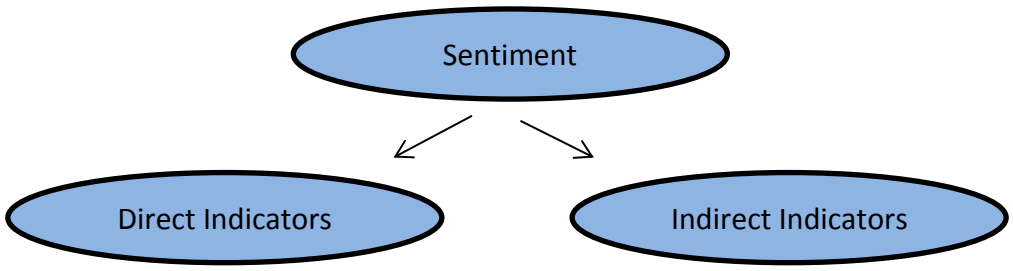

Figure 3.1 Investor Sentiment Indicators

Direct indicators use surveys to measure sentiment, whereas indirect indicators use different market variables.

The indirect indicators in this study are classified into two groups as market wide and institutional. Put/Call Ratio, Closed-end-fund discounts and Baker & Wurgler (2006)'s sentiment index are market wide indicators. These indicators measure market wide sentiment, whereas the State Street investor confidence index measures institutional investors' sentiment.

The direct indicators in this study are the University of Michigan Consumer Sentiment Index, the Conference Board Consumer Confidence Index, Gallup Economic Confidence Index, Gallup Economic Conditions, Gallup Economic Outlook, and the American Association of Individual Investors (AAII) Sentiment Survey.

As it is seen, consumer confidence indices are also considered sentiment indicators in this study. Even though the respondents of confidence indices may not be real investors and questions of the surveys may not fully reflect the investor sentiment, several studies use confidence indices as a proxy for sentiment ((Lemmon & Portniaguina, 2006), (Bergman & Roychowdhury, 2008), and (Stambaugh, Yu, & Yuan, 2012)). Considering these papers, consumer confidence indices are classified as sentiment indicators in this study as well.

These are the indicators that included in this study. There are other indicators that are accepted as sentiment measures in the literature and in the investment community.

3.1.1 Indirect Indicators

Indirect indicators measure the sentiment by observing several other variables in the market. Put/call ratio, closed-end-fund discounts, composite indices, and the State Street Investor Confidence Index can be classified as indirect indices. The State Street Investor Confidence Index measures institutional sentiment. Others measure market wide sentiment.

3.1.1.1 Put/Call Ratio

Call option is a kind of derivative that gives an owner the option to purchase a stock at a predetermined price, whereas a put option lets the owner to sell a stock at a predetermined price; therefore, one may buy a call option if he or she expects the stock will go up or one may buy a sell option if he or she expects the stock will go down (Bodie et al., 2009).

The ratio of put options to call options is called as put/call ratio. A rise in this ratio is interpreted as a decrease in sentiment since investors purchase put options to protect their portfolios against possible market crashes (Bodie et al., 2009). Figure 3.2 illustrates the daily put/call ratios and the S&P 500 index prices.

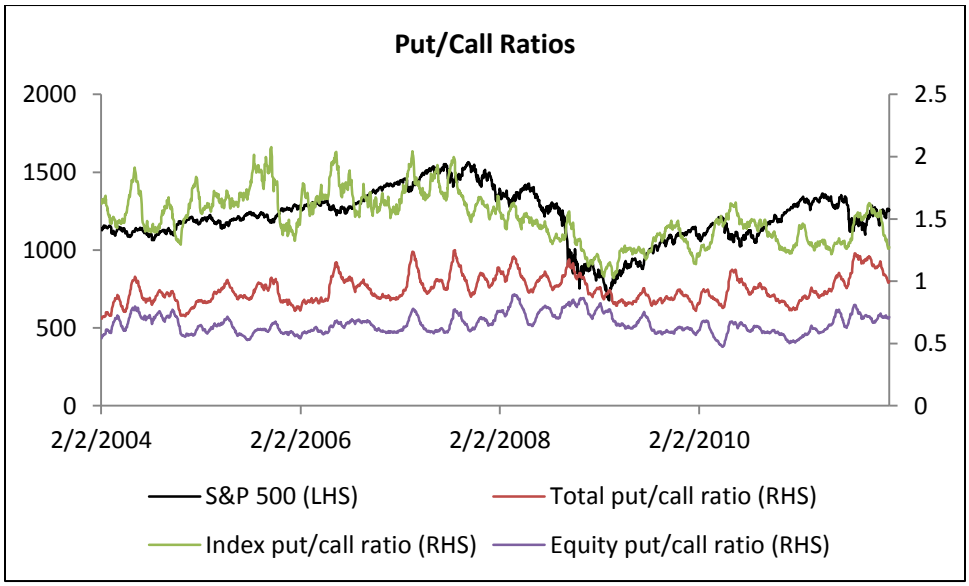

Figure 3.2 Put/Call Ratios[1] and S&P 500 Index

3.1.1.2 Closed-end Fund discounts

Closed-end funds are a type of mutual funds in which the price deviates from its Net Asset Value (NAV). In order to find the NAV, the difference between the market

[1] Put/call ratio data is available at http://www.cboe.com/data/PutCallRatio.aspx

value of assets and liabilities is divided by the number of shares outstanding (Bodie et al., 2009). While the cause of price deviations from the NAV is not fully understood, agency cost, tax liabilities, and illiquidity of assets are possible contributing factors (Lee, Shleifer, & Thaler, 1990).

Zweig (1973) stated that discounts on closed-end funds reflect individual investors' sentiment. In addition, Lee et al. (1990) stated that the movements of closed-end funds' discounts indicate changes in investor sentiment.

Figure 3.3 shows the relationship between discounts on closed-end fund[2] and S&P500 index.

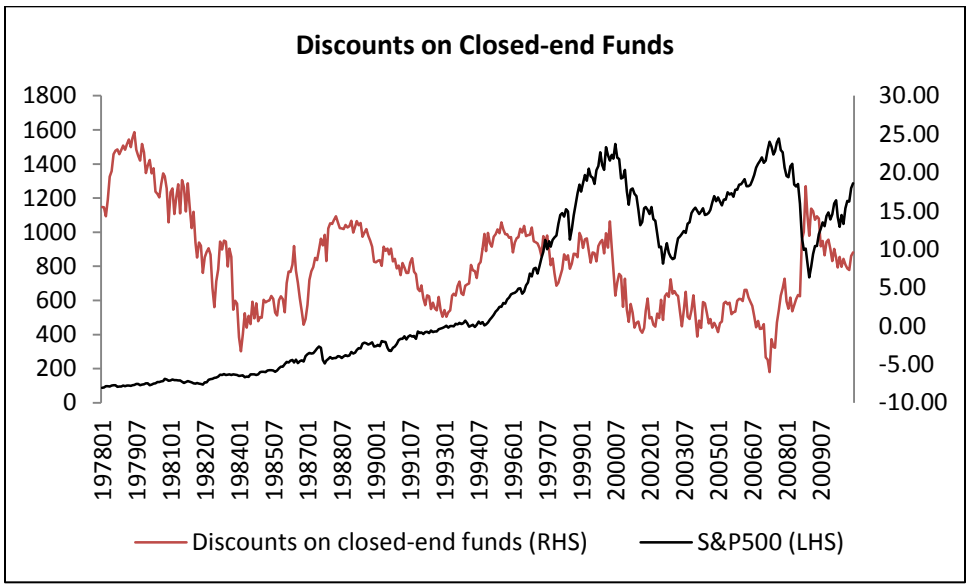

Figure 3.3 Discounts on Closed-end Funds and S&P 500

3.1.1.3 Baker & Wurgler (2006) Composite Index

Baker & Wurgler (2006) introduced a composite sentiment index which has been widely used in the finance literature. The index considers six factors which are discount on closed-end funds, turnover ratio of NYSE, number of IPO, average first day returns of IPOs, share of equity, and dividend premium. Figure 3.4 illustrates the composite index and the S&P 500 index.

[2] Data for discounts on closed-end funds are obtained from http://people.stern.nyu.edu/jwurgler/.

3.1.1.4 State Street Investor Confidence Index

State Street's Investor Confidence Index considers institutional investors' holdings in risky assets[3] while measuring sentiment. Since an increase in risky asset holdings may indicate an increase in confidence, the model presents higher point for index in such time periods.

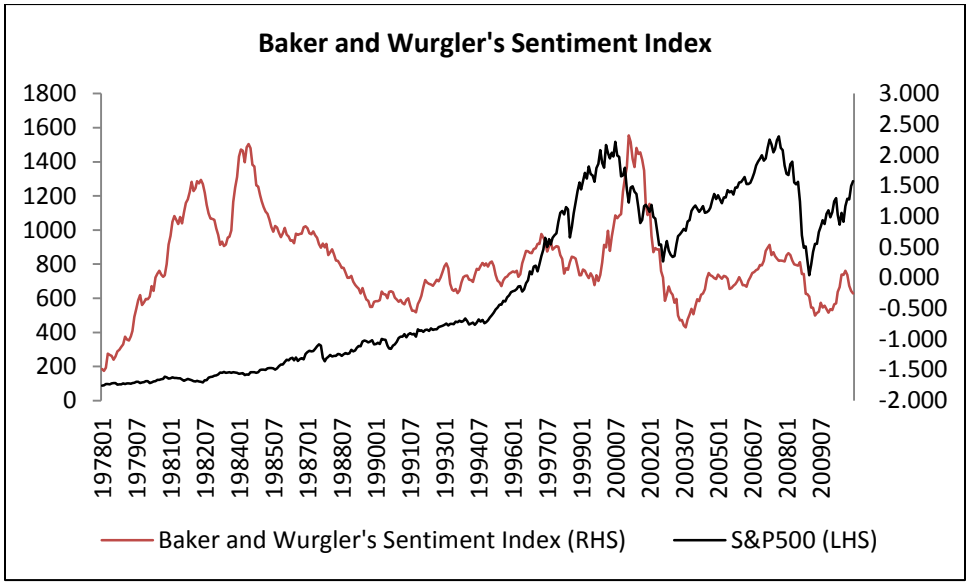

Figure 3.4 Baker and Wurgler's Sentiment Index[4] and S&P 500

3.1.2 Direct Indicators

Direct indicators measure the sentiment directly by using surveys. The University of Michigan Consumer Sentiment Index, the Conference Board Consumer Confidence Index, Gallup Economic Confidence Index, Gallup Economic Conditions, Gallup Economic Outlook, and the American Association of Individual Investors Sentiment Survey are the examples covered in this study.

[3] Data is available at http://statestreetglobalmarkets.com/research/pdf/summary.pdf
[4] Data is available at http://people.stern.nyu.edu/jwurgler/

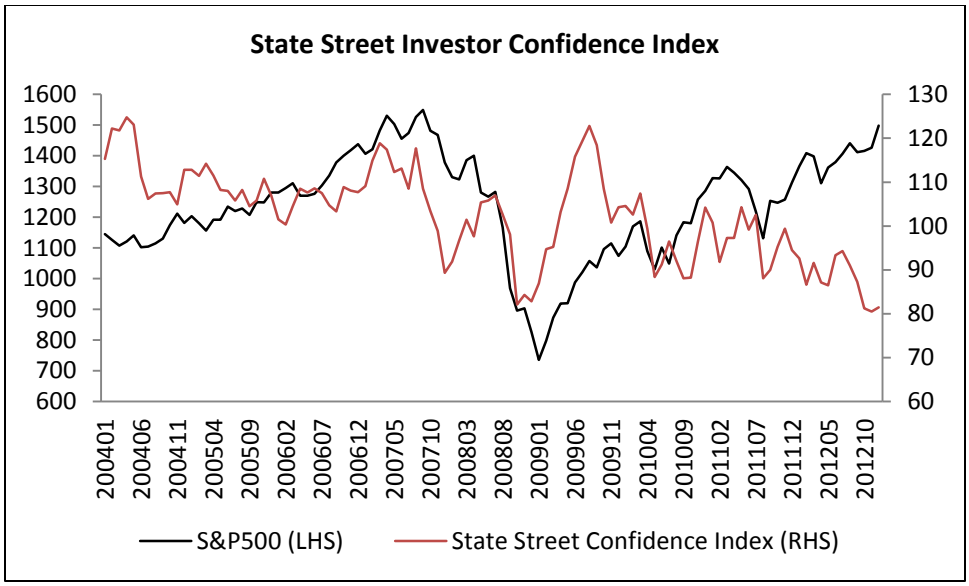

Figure 3.5 State Street Investor Confidence Index[5]

3.1.2.1 The University of Michigan Consumer Sentiment Index

The University of Michigan Consumer Sentiment Index asks questions regarding present and future economic conditions. Table 3.1 shares these questions. The University of Michigan Consumer Sentiment Index has two parts: present conditions and expectations. Two questions are asked to reveal the feelings about present conditions and three questions are asked to understand respondents' expectations about the future.

The figure 3.6 illustrates the relationship between the University of Michigan Consumer Sentiment Index[6] and the S&P500 index over 30 years.

[5] The index data is available at http://www.statestreet.com/investorconfidenceindex

[6] Data for the Michigan Sentiment Index is available at http://research.stlouisfed.org/.

Table 3.1 Questions of the University of Michigan's Survey[7]

The University of Michigan Consumer Sentiment Survey
Present Conditions Questions
1. Do you think now is a good or bad time for people to buy major household items? [good time to buy/uncertain, depends/ bad time to buy]
2. Would you say that you (and your family living there) are better off or worse off financially than you were a year ago? [better/same/worse]
Expectations Questions
3. Now turning to business conditions in the country as a whole—do you think that during the next twelve months, we'll have good times financially or bad times or what? [good times/uncertain/bad times]
4. Looking ahead, which would you say is more likely—that in the country as a whole we'll have continuous good times during the next five years or so or that we'll have periods of widespread unemployment or depression, or what? [good times/uncertain/ bad times]
5. Now looking ahead—do you think that a year from now, you (and your family living there) will be better off financially, or worse off, or just about the same as now? [better/same/worse]

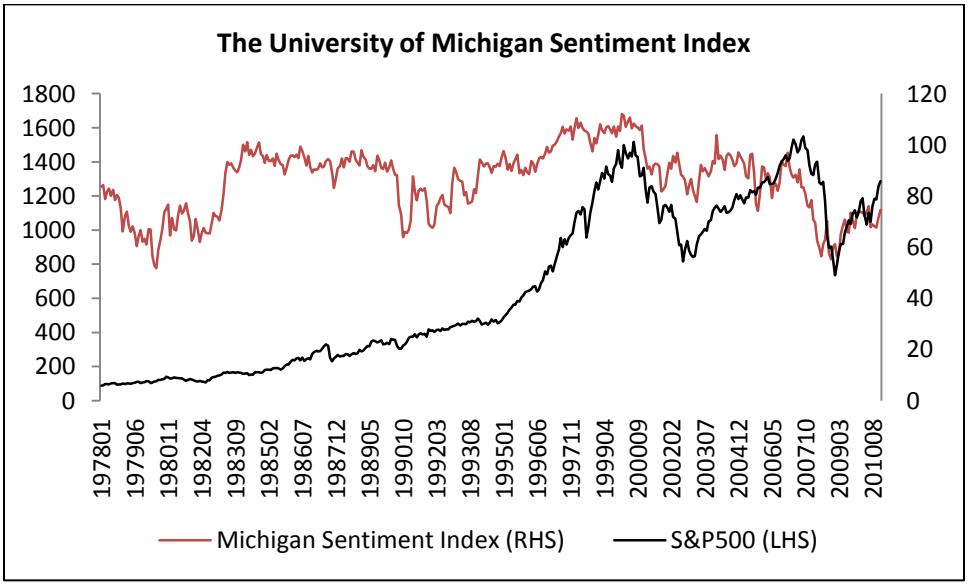

Figure 3.6 The University of Michigan Consumer Sentiment Index

[7] The questions of the survey is obtained directly from Bram & Ludvigson (1998)

3.1.2.2 The Conference Board Consumer Confidence Index

The Conference Board Consumer Confidence Index uses questions similar to the University of Michigan Consumer Sentiment Index. Both are the most popular proxies for consumer confidence in the United States (Bram & Ludvigson, 1998). Table 3.2 shares the survey questions, and figure 3.7 illustrates the Conference Board Consumer Confidence Index's movements along with the S&P 500 index over 30 years.

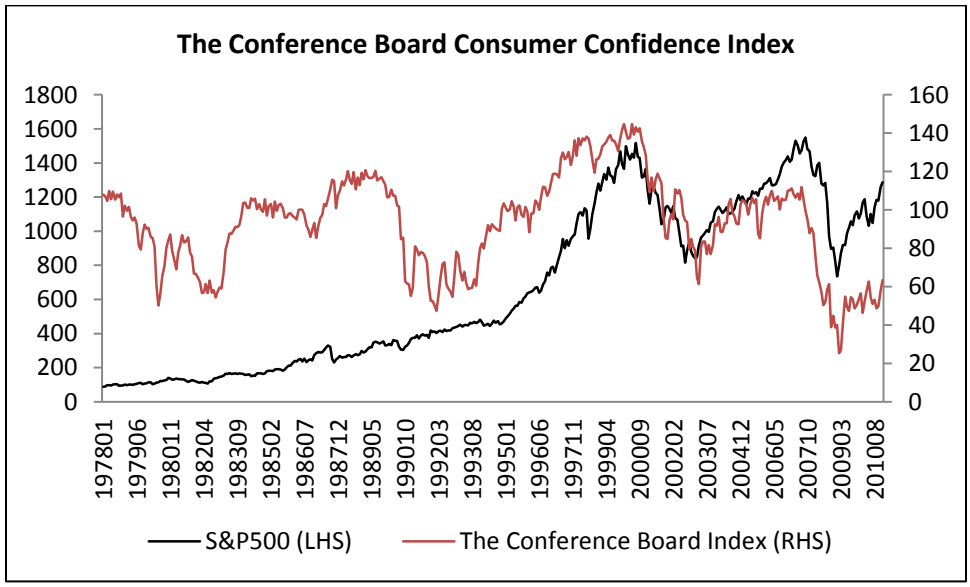

Figure 3.7 The Conference Board Consumer Confidence Index[8]

3.1.2.3 Gallup – Economic Confidence Index

Gallup's Economic Confidence Index is built by considering answers to two questions: economic conditions and economic outlook. Two questions are asked to approximately 15,000 national adults by telephone. Figure 3.8 shares the trend of this economic confidence index[9] and S&P 500 index.

[8] Data is available at http://future.aae.wisc.edu/data/monthly_values/by_area/998

[9] Data is available at http://www.gallup.com

Table 3.2 The Questions of the Conference Board's Survey

The Conference Board Consumer Confidence Index[10]
Present Conditions Questions
1. How would you rate present general business conditions in your area? [good/normal/bad]
2. What would you say about available jobs in your area right now? [plentiful/not so many/hard to get]
Expectations Questions
3. Six months from now, do you think business conditions in your area will be [better/same/worse]?
4. Six months from now, do you think there will be [more/same/ fewer] jobs available in your area?
5. How would you guess your total family income to be six months from now? [higher/same/lower]

3.1.2.4 Gallup – Economic Conditions

Gallup surveys economic conditions every day. Around 15,000 respondents are asked to rate the conditions as excellent, good, only fair, or poor. These results are also used in building Gallup's Economic Confidence Index. Figure 3.9 shares the monthly ratio of poor and excellent/good answers[11].

3.1.2.5 Gallup – Economic Outlook

Respondents are asked to share their opinion about whether the economic conditions are getting better or getting worse. The percentages are used to understand the future expectations. These results are also used in building Gallup's Economic Confidence Index.

[10] The questions of the survey is obtained directly from Bram & Ludvigson (1998)
[11] Data is available at http://www.gallup.com

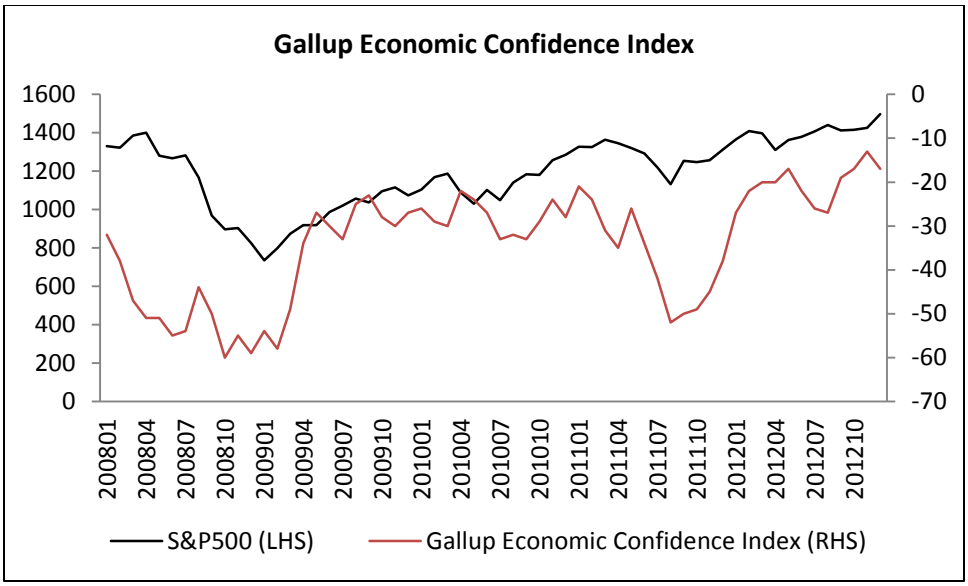

Figure 3.8 Gallup Economic Confidence Index

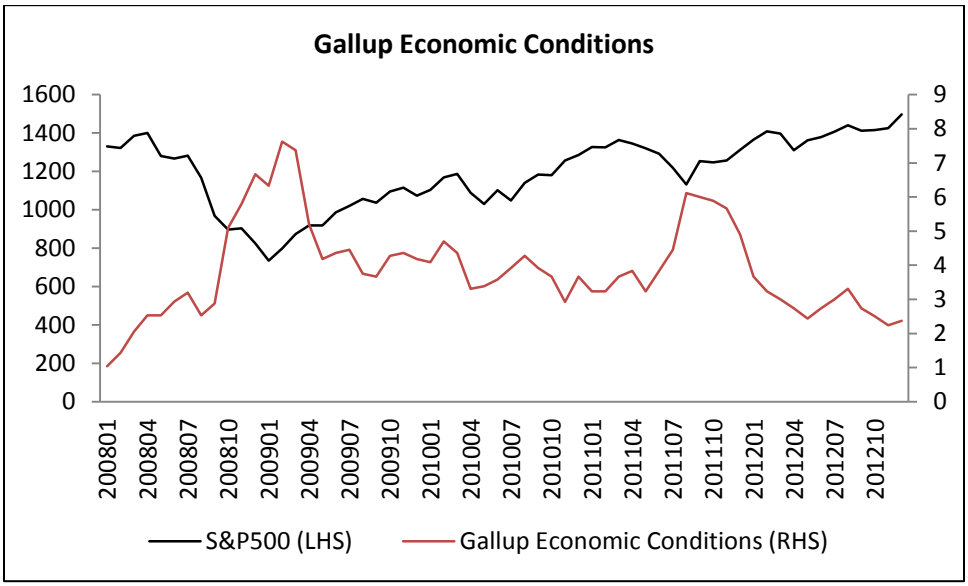

Figure 3.9 Gallup Economic Conditions

3.1.2.6 The American Association of Individual Investors Sentiment Survey

The American Association of Individual Investors (AAII) asks its members (individual investors) to share their opinions about the stock market for the next six months. The answers are collected weekly and placed in one of three categories: bullish,

neutral, and bearish. The percentages of answers reflect the individual investors' sentiment. Figure 3.11 illustrates the survey and the S&P 500 index.

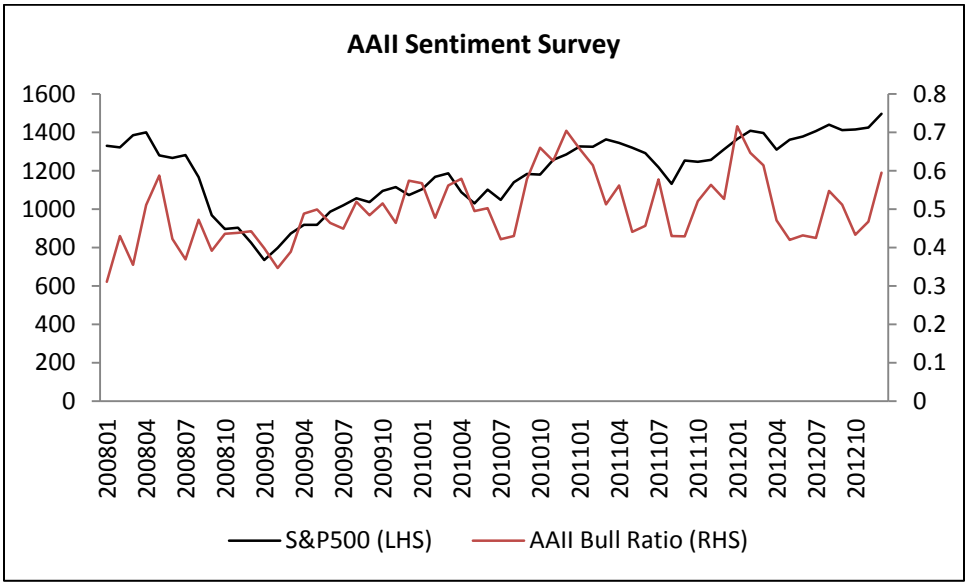

Figure 3.10 The American Association of Individual Investors' Survey[12]

3.2 Relationship Among Indicators

Intuitively, one may assert that all sentiment indicators should be correlated. However, since each uses different methods and variables to measure the sentiment, examining these relationships would be logical.

Table 3.3 shares simple statistics of investor sentiment indicators. Table 3.4 shows the correlation coefficients among sentiment indicators. According to the table 3.4, Gallup Economic Confidence Index and Gallup Economic Outlook have a significant positive relationship with a 0.9 correlation coefficient and it is expected because the Gallup Economic Outlook is one of the components of the Gallup Economic Confidence Index. However, even though Gallup economic conditions index is another component of Gallup economic confidence index, the correlation coefficient between them is -0.3. The relationship is negative because the ratio of "poor" answers and "good" or

[12] http://www.aaii.com/sentimentsurvey

“excellent” answers (poor / good or excellent) is used as a variable that represents Gallup economic conditions. Sample size is three years for the correlation table. When we used five years the data, the coefficient is -0.53 for these two indices. The interesting finding is that Gallup economic conditions index, which surveys current conditions, is not correlated with Gallup economic outlook, which surveys the future. It suggests that current situation of market does not have significant impact on people’s expectation about the future. The American Association of Individual Investors Sentiment Survey’s bull ratio is positively correlated with Gallup economic confidence index (0.54) and Gallup economic outlook (0.56). It suggests that individual investors’ sentiment may be correlated with market wide sentiment. The highest correlation is between the Gallup economic conditions and the Conference Board Consumer Confidence Index (-0.92). Again, the correlation is negative due to the variable definition of Gallup economic conditions. One would expect this correlation to be lower since the Conference Board has three questions about the future. The University of Michigan Consumer Sentiment Index is positively correlated with Gallup economic confidence index (0.83) and the Conference Board (0.63). Discounts on closed-end funds is positively correlated with Gallup economic conditions (0.83) and negatively correlated with conference board (-0.69). The signs are as expected since discounts on closed-end funds are larger in recession times (Lee et al., 1990). Thus, there should be negative relationship between sentiment indices and discount on closed-end funds. Table 3.4 also shows that discounts on closed-end funds are negatively correlated with Baker & Wurgler's (2006) investor sentiment index since discounts on closed-end funds is a variable of Baker & Wurgler's (2006) with a negative coefficient. Baker & Wurgler's (2006) indices are positively correlated because the only difference is orthogonalized one does not reflect macroeconomic cycles. Baker & Wurgler's (2006) investor sentiment index is positively correlated with the Conference Board Consumer Confidence Index (0.55); however, it is almost not related with the University of Michigan Consumer Sentiment Index (-0.07). The analysis performed with larger sample size (from 1978 to 2010) suggests that Baker & Wurgler's (2006) investor sentiment index is not significantly correlated with the

University of Michigan Consumer Sentiment Index (0.25) and the Conference Board Consumer Confidence Index (0.18).

The direct indicators presented in this study can be considered individual sentiment since the respondents are most likely individuals that are not linked to institutional asset management companies. It is true that these respondents may not be active investors; however, they are individuals that have opinion about market conditions. Only the American Association of Individual Investors Sentiment Survey is filled out by real individual investors so this indicator may reflect the individual investors' expectations and feelings better. Since these direct indicators somehow reflect the individuals' expectations about the market, one may expect significant correlations among these indicators. The correlation table and figure 3.12 support this hypothesis.

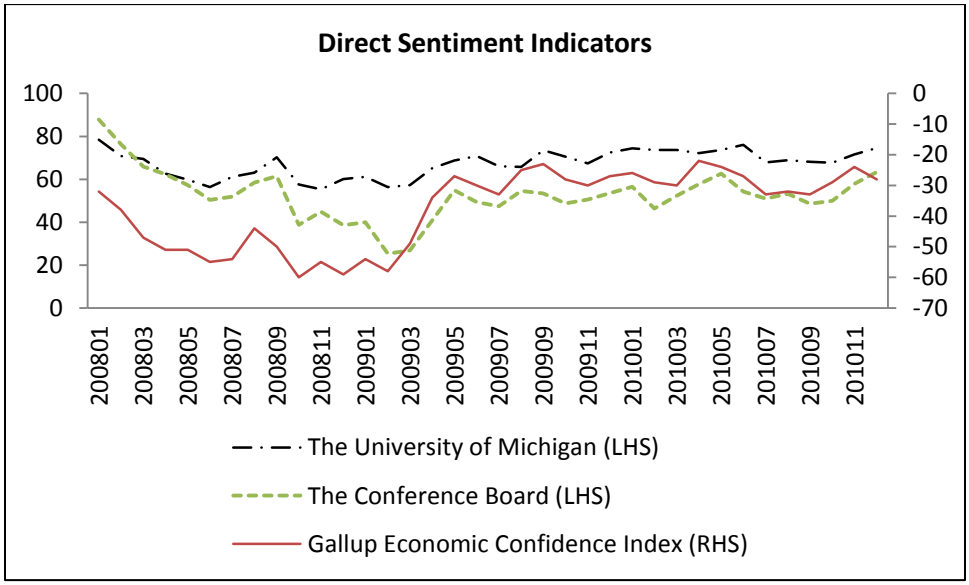

Figure 3.11 : Direct Sentiment Indicators

The indirect indicators do not have similarities as direct indicators have. For example, the State Street Investor Confidence Index measures the sentiment of institutional investors. Baker & Wurgler's (2006) investor sentiment index and discounts on closed-end funds present a market level sentiment. Once again, Baker & Wurgler's (2006) investor sentiment index and discounts on closed-end funds are correlated since

discounts on closed-end funds is one of the six components of Baker & Wurgler's (2006) index. However, State Street Investor Confidence Index is not correlated with others. This result suggests that institutional sentiment may be different than market level sentiment.

Table 3.3 Simple Statistics of Investor Sentiment Indicators

GE is Gallup economic confidence index, GC is Gallup Economic Conditions, GO is Gallup Economic Outlook, AA is the American Association of Individual Investors Sentiment Survey's bull ratio, CB is the Conference Board Consumer Confidence Index, SS is State Street Investor Confidence Index, MI is the University of Michigan Consumer Sentiment Index, BO is orthogonalized Baker & Wurgler's (2006) Investor Sentiment Index, BW is Baker & Wurgler's (2006) Investor Sentiment Index, and DC is discounts on closed-end funds. N shows the sample size. In this analysis, years from 2008 to 2010 are used.

Simple Statistics						
Variable	**N**	**Mean**	**Std Dev**	**Sum**	**Minimum**	**Maximum**
GE	36	-37.52778	12.4131	-1351	-60	-22
GC	36	4.00692	1.46906	144.249	1.03704	7.625
GO	36	26.80556	11.7469	965	8	41
AA	36	0.48237	0.0892	17.3654	0.31113	0.70445
CB	36	52.59167	11.7029	1893	25.3	87.9
SS	36	99.80833	10.1838	3593	82.1	122.8
MI	36	67.28333	6.30929	2422	55.3	78.4
BO	36	-0.05122	0.24645	-1.844	-0.49	0.45
BW	36	-0.17064	0.32506	-6.143	-0.617	0.403
DC	36	9.18083	4.12486	330.51	1.93	18.23

Direct and indirect measurements of sentiment are not related to each other. Only Baker & Wurgler's (2006) investor sentiment index and the Conference Board consumer confidence index is correlated (0.55). This result suggests that surveying individuals may reflect different sentiment than indirect measurements do.

Table 3.4 Correlations among Investor Sentiment Indicators

GE is Gallup economic confidence index, GC is Gallup Economic Conditions, GO is Gallup Economic Outlook, AA is The American Association of Individual Investors Sentiment Survey's bull ratio, CB is the Conference Board Consumer Confidence Index, SS is State Street Investor Confidence Index, MI is the University of Michigan Consumer Sentiment Index, BO is orthogonalized Baker & Wurgler's (2006) Investor Sentiment Index, BW is Baker & Wurgler's (2006) Investor Sentiment Index, and DC is discounts on closed-end funds. The table explains the relationship among sentiment proxies. In this analysis, the years between 2008 and 2010 are used.

	GE	**GC**	**GO**	**AA**	**CB**	**SS**	**MI**	**BO**	**BW**	**DC**
GE	1.00									
GC	-0.30	1.00								
GO	0.91	0.10	1.00							
AA	0.54	-0.14	0.56	1.00						
CB	0.36	-0.92	-0.03	0.09	1.00					
SS	0.40	-0.22	0.35	0.14	0.12	1.00				
MI	0.83	-0.49	0.63	0.34	0.63	0.23	1.00			
BO	-0.41	-0.60	-0.64	-0.19	0.44	-0.08	-0.11	1.00		
BW	-0.38	-0.65	-0.66	-0.26	0.55	-0.35	-0.07	0.79	1.00	
DC	-0.04	0.83	0.30	-0.06	-0.69	-0.09	-0.24	-0.72	-0.77	1.00

One may expect individual and institutional sentiments not to have significant relationship. In order to test this hypothesis, the American Association of Individual Investors Sentiment Survey's bull ratio and State Street's Institutional Investor Sentiment Index can be used. Table 3.4 shows that these indicators are not significantly correlated (0.14).

Among all these indicators, Baker & Wurgler's (2006) investor sentiment index is currently the most popular sentiment proxy considering the number of related papers

(some of them are (Hribar & McInnis, 2011), (Berger & Turtle, 2012), (Kurov, 2010), (Mian & Sankaraguruswamy, 2012), (Ben-Rephael, Kandel, & Wohl, 2012) and (Chen, 2011)).

3.3 Conclusion

In this chapter, sentiment and its indicators are presented. Investor sentiment indicators are classified into two groups as direct and indirect indicators.

Direct indicators measure the sentiment by surveying current market conditions and future expectations. In this study, the University of Michigan Consumer Sentiment Index, the Conference Board Consumer Confidence Index, the Gallup Economic Confidence Index, the Gallup Economic Conditions, the Gallup Economic Outlook, and the American Association of Individual Investors Sentiment Survey are presented as direct sentiment indicators. Only the American Association of Individual Investors Sentiment Survey is asked to active investors. Other direct indicators' respondents may not have investment experience. However, all direct indicators reflect the sentiment of individuals not institutions.

Indirect indicators measures the sentiment by observing different variables such as number of IPOs (Initial Public Offering), discounts on closed-end funds and the percentage of holdings in risky stocks. In this study, put/call ratio, discounts on closed-end funds, Baker & Wurgler's (2006) Investor Sentiment Index and the State Street Investor Confidence Index is presented as indirect sentiment indicators. All indirect indicators in this study reflect market level sentiment except State Street Investor Confidence Index, which reflects institutional investor sentiment.

This chapter found relationship among different direct indicators. For example, the University of Michigan Consumer Sentiment Index has significant relationship with the Conference Board Consumer Confidence Index and Gallup Economic Confidence Index, most probably because of using very similar survey questions. In addition, it is found that the American Association of Individual Investors Sentiment Survey and State

Street Investor Confidence Index, which reflects institutional investor sentiment, are not significantly correlated. In other words, institutional and individual investor sentiments behave differently. Last, it is found direct and indirect indicators are not correlated, which suggests that individual (direct indicators reflect individual sentiment) and market level sentiment (indirect indicators except State Street reflect market level sentiment) might be different.

CHAPTER 4. SENTIMENT AND STOCK RETURNS

One reading the previous chapter may think that sentiment indicators can predict the stock returns since it reflects the expectations and feelings that have impact on trading decisions. The literature agrees with this opinion and suggests that there is relationship between sentiment indicators and stock returns ((Baker & Wurgler, 2006), (Neal & Simon, 1998), (Lee et al., 1990) and (Fisher & ; Statman, 2003)).

In this chapter, this relationship between sentiment indicators and stock returns will be examined in the US stock market first. Then, similar relationship will be investigated in other developed stock markets: UK, Japan, Germany and Europe. It is wondered whether sentiment and stock return relationship exists all over the world or just in developed countries. To be able to answer this question, the relationship will be examined in emerging countries, which are China, Taiwan and Turkey, as well in this study.

4.1 The Relationship between Sentiment and Stock Return

Literature asserts that there is relationship between stock returns and sentiment indicators. For example, Baker & Wurgler's (2006) state that when sentiment is high, the stock returns are lower in the next time period. Lee et al., (1990) suggest that discounts on closed-end funds may explain small stock's return. Fisher & Statman (2003) claim that the University of Michigan Consumer Sentiment Index and the Conference Board are able to estimate stock returns. Sentiment and stock return relationship will be examined by using the S&P 500 index in the next section.

4.2 S&P 500 Returns and Sentiment Indicators

S&P 500 index is one of the most popular indexes that represent the US stock market. This index consists of 500 stocks from important industries. Its adjusted market cap is $13,869 billion, its average market cap is $28 billion, and its most covered industries are information technology and consumer discretionary as of March 22, 2013[13]. S&P 500 index will be used as a market index in this study as it was used by Fisher & Statman (2003).

In this study, all sentiment indicators data are on a monthly basis except put/call ratios. Put/call ratios are available on a daily basis. Table 4.1 indicates that the relationship between daily put/call ratios and S&P 500 stock returns is statistically significant. However, put/call ratios do not predict the subsequent S&P 500 returns.

Table 4.1 Relationship between Put/Call Ratios and S&P 500

The table shares correlation coefficients between daily put/call ratios and contemporaneous S&P500 returns. The signs ***, ** and * indicate significant relationship at the level of 1%, 5% and 10%, respectively. Sample size (N) is 1995.

Put/Call Ratio	**Correlation Coefficient**
Total put/call ratio	-0.3277***
Index put/call ratio	-0.1882***
Equity put/call ratio	-0.3387***

Brown & Cliff (2005) stated that investor sentiment indicators estimate the next few years' stock returns. By considering this finding, table 4.2 shares correlation between sentiment indicators and lagged S&P 500 returns (monthly). Apart from lagged returns, contemporaneous returns are used to evaluate the relationship between stock returns and sentiment indicators. Sentiment indicators and the S&P 500 Index are found

[13] Information about S&P500 is obtained from http://www.standardandpoors.com

not to be significantly correlated except with the Gallup Economic Outlook (significant at 5%).

Both cotemporaneous and lagged S&P returns are not significantly correlated with sentiment indices except Gallup Economic Outlook. Brown & Cliff (2005) used log of returns other than the real returns for their analysis. Table 4.2 also displays the correlation coefficients between sentiment indicators and log returns.

Panel A and Panel B show very few significant relationships between sentiment indicators and market return. Qiu & Welch (2004) examined the relationship between sentiment indicators and stock returns by using change in indicators. Considering this paper, panel C shows the relationship between change in sentiment indicators and market return. In this case, State Street investor confidence index is significant.

So far, a simple linear regression method is used to examine the relationship between sentiment indicators and stock market returns. One may assert that control variables should be used to eliminate the effect of other risk factors. In order to observe the relationship between sentiment indicators and market return better, Fama & French's (1996) three factors, which are market, size and value premium, are added to the regression.

$$R_t - rf_t = \alpha + \beta\,(Rm - rf)_t + s(SMB)_t + h(HML)_t + \delta\,(S)_{t-1} + \varepsilon$$

Ri : return of S&P 500 index

rf : risk-free rate

Rm – rf : the difference between rf and return of value-weighted market portfolio

SMB = size premium

HML: value premium

S : sentiment measure

β, s, h and δ : regression coefficients

ε : common error

Table 4.2 Correlation between Indicators and S&P500 Returns

GE is Gallup economic confidence index, GC is Gallup Economic Conditions, GO is Gallup Economic Outlook, AA is the American Association of Individual Investors Sentiment Survey's bull ratio, CB is the Conference Board Consumer Confidence Index, SS is State Street Investor Confidence Index, MI is the University of Michigan Consumer Sentiment Index, BO is orthogonalized Baker & Wurgler's (2006) Investor Sentiment Index, BW is Baker & Wurgler's (2006) Investor Sentiment Index, and DC is discounts on closed-end funds. GE, GC, GO and AA are between January 2008 and December 2012 (N: 60). SS is between January 2004 and December 2012 (N: 108). MI, BO, BW, BC, DC and CB are between January 1978 and December 2010 (N: 396). The table shares correlation coefficients between sentiment indicators and contemporaneous, one month, and two month lagged S&P500 returns. The signs ***, ** and * indicate significant relationship at the level of 1%, 5% and 10%, respectively.

Panel A. Correlation between Indicators and lagged S&P500 Returns

Sentiment Indicators	S&P500 Index - Contemporaneous	S&P500 Index - 1 month lagged	S&P500 Index - 2 months lagged
MI	-0.00675	-0.00246	0.00086
BO	-0.07068	-0.06756	-0.06124
BW	-0.06389	-0.05586	-0.05494
BC	0.00908	-0.01888	0.08735*
DC	0.0324	0.02559	0.04925
CB	-0.03601	-0.03497	-0.02558
GE	0.23637*	0.17579	0.19847
GC	0.15024	0.19569	0.17573
GO	0.30032**	0.23034*	0.25781*
AA	0.0924	-0.03079	0.17771
SS	0.1126	-0.0133	-0.056

Table 4.2 (continued)

Panel B. Correlation between Sentiment Indicators and log S&P500 Returns

Indicators	S&P500	S&P500 (t+1)	S&P500 (t+2)
MI	-0.00418	0.00005	0.00285
BO	-0.0724	-0.06917	-0.06293
BW	-0.06536	-0.05738	-0.05654
BC	0.00865	-0.01538	0.08723*
DC	0.02907	0.02258	0.04631
CB	-0.03471	-0.03404	-0.02486
GE	0.24959*	0.18893	0.21253
GC	0.13824	0.18565	0.16913
GO	0.31074**	0.24199*	0.27024**
AA	0.1031	-0.02244	0.18623
SS	0.121811742	-0.004013916	-0.047857989

Panel C. Correlation between Change in Sentiment Indicators and log S&P500 Returns

Δ Indicators	S&P 500	S&P500 (t+1)	S&P500 (t+2)
MI	-0.02615	-0.01988	0.00484
BO	0.09807*	-0.04103	-0.04561
BW	-0.07555	-0.04208	0.07805
BC	0.01037	-0.03409	-0.09087*
DC	0.04694	0.03057	-0.05315
CB	0.00777	-0.04583	-0.01931
GE	-0.07345	0.02047	-0.18165
GC	-0.11776	0.04535	-0.33588**
GO	0.1412	-0.21906*	-0.0469
AA	0.09561	-0.25655*	0.22037*
SS	0.25162***	0.09536	0.20812**

Similar regression function is used by Baker & Wurgler (2006), adding momentum as another control variable. Baker & Wurgler (2006) use previous month's sentiment value to perform a predictive model.

Table 4.3 Sentiment Indicators and S&P500 Returns with Control Variables

Abbreviations are the same with table 4.2. GE, GC, GO and AA are between January 2008 and December 2012 (N: 60). SS is between January 2004 and December 2012 (N: 108). MI, BO, BW, BC, DC and CB are between January 1978 and December 2010 (N: 396).

The multi-regression equation is $R_t - rf_t = \alpha + \beta\ (Rm - rf)_t + s(SMB)_t + h(HML)_t + \delta\ (S)_{t-1} + \varepsilon$. Ri is return of S&P 500 index, rf is risk-free rate, Rm – rf is the difference between rf and return of value-weighted market portfolio, SMB is size premium, HML is value premium, S is sentiment measure, ε is common error, and β, s, h and δ are regression coefficients.

The table shares t-values of sentiment indicator's coefficients. Thus, higher t-values suggest significant relationship between sentiment indicator and S&P 500 index. The signs ***, ** and * indicate significant relationship at the level of 1%, 5% and 10%, respectively.

Sentiment Indicators	S&P500 Index (t) and Indicators(t)	S&P500 Index (t) and indicators(t-1)	S&P500 Index(t) and change in indicators(t-2)
MI	0.15	0.33	-0.83
BO	-1.64	-1.56	1.73*
BW	-1.34	-1.19	-1.7*
BC	-1.03	-0.2	0.48
DC	-0.12	-0.2	0.96
CB	-0.74	-0.68	-0.01
GE	1.22	-0.17	-0.38
GC	1.07	0.13	-0.37
GO	1.62	-1.5	0.87
AA	-0.11	-2.21**	0.21
SS	2.43**	2.334**	5.32***

The findings suggest that State Street Investor Confidence Survey may be a good proxy for the overall market in the US. Several sentiment indicators do not have significant relationship with the S&P 500 index. Additionally, these results suggest that stocks in the S&P 500 index due to their large market capitalizations. This hypothesis will be examined in the next sections.

4.3 Evidence in Other Countries

The previous section showed that sentiment indicators have impact on stock prices in the US stock market. One may ask whether this relationship exists in other countries. To answer this question, sentiment surveys data are collected for Japan, UK, Germany, Euro-area, China, Taiwan and Turkey. The relationships between sentiment surveys and the countries' stock indices (representing the overall market) are examined.

4.3.1 Japan

The Economic and Social Research Institute at Cabinet Office of Government of Japan releases monthly consumer confidence data[14]. This survey aims to understand changes in the opinion of consumers in the economy and it covers over 50 million households excluding students, institutions and people from different countries. 6,720 households are surveyed in the middle of each month. The Consumer Confidence Index has four parts: "overall livelihood", "income growth", "employment" and "willingness to buy durable goods". Respondents are asked to evaluate these parts for the following six months by giving grades from one to five. Figure 4.1 illustrates the confidence index and its parts.

The NIKKEI (NKY) index consists of 225 Japanese companies, and it is one of the proxies of Japanese stock market followed by the financial communities all over the world. Figure 4.2 illustrates the relationship between Japanese Consumer Confidence Index and NIKKEI.

[14] Information about index is available at http://www.cao.go.jp/index-e.html

Table 4.4 indicates that there is statistically significant relationship among parts of consumer confidence index.

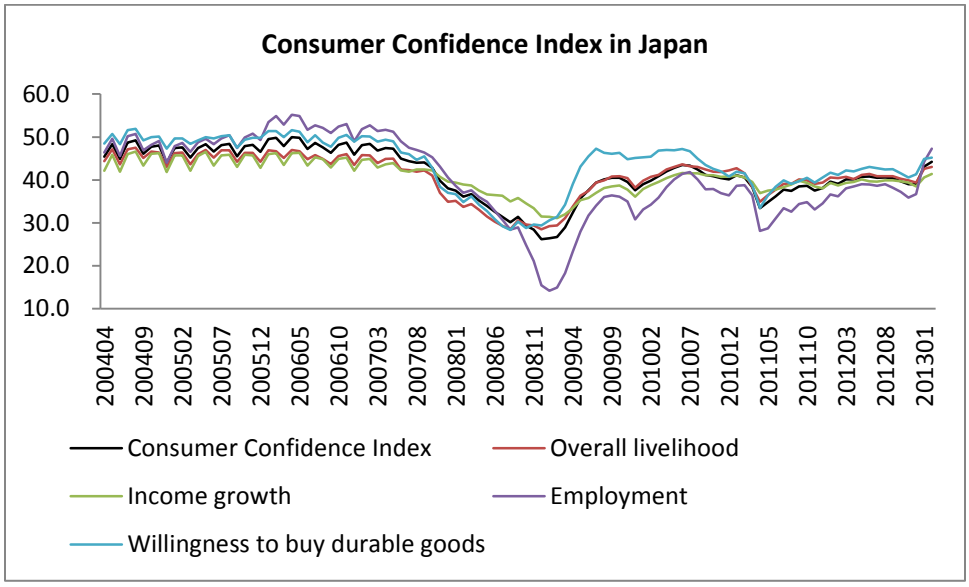

Figure 4.1 Consumer Confidence Index in Japan

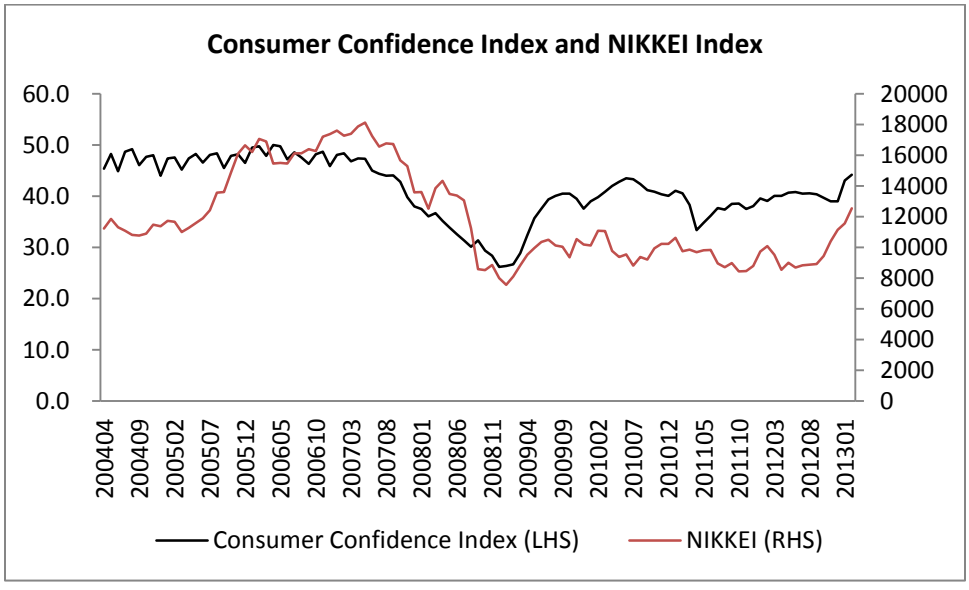

Figure 4.2 Japanese Consumer Confidence and NIKKEI Index

Table 4.4 Confidence Index Components

Panel A shares correlation coefficients among the Japanese Consumer Confidence index's components. Panel B. shares correlation coefficients between NIKKEI Index and the Consumer Confidence Index, and its components. Panel C shares t-values of regression between monthly NIKKEI Index return and the change in sentiment indicators in Japan CCI is consumer confidence index, OL is overall livelihood, IG is income growth, E is employment, and WB is willingness to buy durable goods. The signs ***, ** and * indicate significant relationship at the level of 1%, 5% and 10%, respectively. Monthly data 04/2004 to 01/2013 periods are used (N: 118).

Panel A. Correlation among Confidence Index Components

	CCI	OL	IG	E	WB
CCI	1	0.96746	0.9659	0.96554	0.94487
OL	0.96746	1	0.92001	0.87641	0.95697
IG	0.9659	0.92001	1	0.95733	0.84769
E	0.96554	0.87641	0.95733	1	0.84327
WB	0.94487	0.95697	0.84769	0.84327	1

Panel B. NIKKEI and Sentiment Indicators

	Correlation Coefficients (t)				
	CCI	OL	IG	E	WB
NIKKEI (t)	0.16339*	0.21987**	0.13185	0.09353	0.2154**
NIKKEI (t+1)	0.10655	0.16856*	0.06847	0.03627	0.17046*

Panel C. NIKKEI and Change in Sentiment Indicators

	t-values				
	CCI	OL	IG	E	WB
NIKKEI (t)	2.46**	1.93*	1.66*	2.99***	1.98*

Additionally, table 4.4 suggests the NIKKEI and Japanese Consumer Confidence Index have a significant contemporaneous relationship. In addition, table 4.4 suggests that "overall livelihood" and "willingness to buy durable goods" can predict the subsequent NIKKEI returns. When the changes in sentiment indicators are regressed with NIKKEI, all indicators seem significant.

One may assert the previous regression (or correlation) does not consider control variables that might be the real reason of the relationship. To be able to answer this question, control variables need to be used along with the confidence index. Fama & French (1996) introduced a three-factor asset pricing model that uses market, size and value premiums as control variables. French's data library contains these factors and momentum factors for Japan[15]. Fama & French's (1996) three factors, momentum factors, and consumer confidence index will be used as independent variables to explain the excess return of NIKKEI.

$$R_t - rf_t = \alpha + \beta\,(Rm - rf)_t + s(SMB)_t + h(HML)_t + w(WML)_t + \delta\,(S)_{t-1} + \varepsilon$$

where Ri is return of NIKKEI, rf is risk-free rate, Rm – rf is the difference between rf and return of value-weighted market portfolio, SMB is size premium, HML is value premium, WML is momentum premium, S is sentiment measure, ε is common error, and β, s, h, w and δ are regression coefficients.

Table 4.5 indicates that when control variables are used, consumer confidence components are not able to predict the market returns. However, overall liveliness and willingness to buy durable goods are still significantly related to the NIKKEI return. Panel B shows changes in sentiment indicators, except income growth, are significantly correlated with NIKKEI.

[15] Data is available at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Table 4.5 NIKKEI Index and Sentiment Indicators with Control Variables

Panel A shares t-values of regression between the monthly NIKKEI Index return and sentiment indicators in Japan. Panel B shares t-values of regression between monthly NIKKEI Index return and change in sentiment indicators in Japan. CCI is consumer confidence index, OL is overall livelihood, IG is income growth, E is employment, and WB is willingness to buy durable goods. The signs ***, ** and * indicate significant relationship at the level of 1%, 5% and 10%, respectively. Monthly data 04/2004 to 01/2013 periods are used (N: 118).

Panel A. NIKKEI Index Return and Sentiment Indicators

	t-value (t)				
	CCI	OL	IG	E	WB
NIKKEI (t)	1.40	2.01**	1.22	0.75	1.80*
NIKKEI (t+1)	0.90	1.52	0.63	0.30	1.36

Panel B. NIKKEI Index and Change in Sentiment Indicators

	t-value (t)				
	CCI	OL	IG	E	WB
NIKKEI (t)	2.10**	1.73*	1.50	2.32**	1.78*

All in all, we observe that the Consumer Confidence Index prepared by the government of Japan is related to the market returns. Therefore, there is evidence of sentiment and stock return relationship in Japan.

4.3.2 Europe Area (Eurozone)

The European Commission releases monthly economic sentiment indicators[16] for the Euro Area and European countries. Each economic sentiment indicator has 5

[16] http://ec.europa.eu/economy_finance/db_indicators/surveys/index_en.htm

components: “industrial confidence” (40%), “services confidence” (30%), “consumer confidence” (20%), “retail trade confidence” (5%), and “construction confidence” (5%).

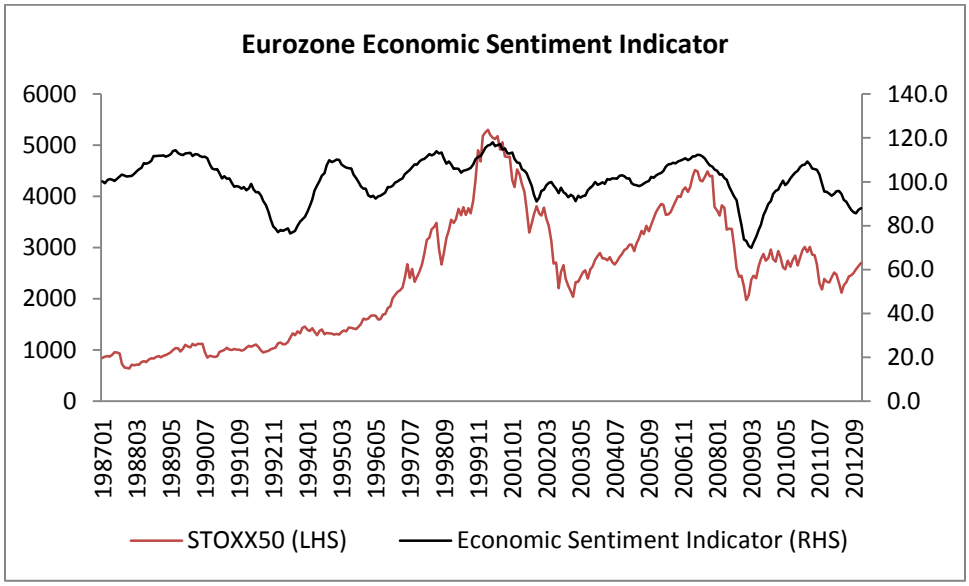

Figure 4.3 Eurozone Economic Sentiment Indicator and STOXX 50 Index

The STOXX 50 index, which consists of 50 stocks from euro area, is used as a proxy for the Euro Area’s stock market.

Table 4.11 indicates change in the Euro Area’s economic sentiment indicators and monthly return of the STOXX 50 is not significantly correlated at 0.05 levels; however, there is a positive correlation between them (p-value: 0.11). Interestingly, it is found the DAX index, which represents the German stock market, is significantly correlated with the change in the Euro Area’s economic sentiment indicators.

Similar regression is performed by considering momentum and Fama/French Factors[17] as control variables.

$$R_t - rf_t = \alpha + \beta\,(Rm - rf)_t + s(SMB)_t + h(HML)_t + w(WML)_t + \delta\,(\Delta S)_t$$

[17] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Table 4.6 Correlation of Euro Area's Sentiment Indicator with STOXX 50 and DAX

Panel A shows the relationship of change in the Euro Area's economic sentiment indicator with STOXX 50 and DAX without using control variables. Panel B shows the relationship of change in the Euro Area's economic sentiment indicator with STOXX 50 and DAX by considering momentum and Fama/French Factors as control variables. The regression: $R_t - rf_t = \alpha + \beta\ (Rm - rf)_t + s(SMB)_t + h(HML)_t + w(WML)_t + \delta\ (\Delta S)_t$. Ri is return of STOXX 50 and DAX indices, rf is risk-free rate, Rm – rf is the difference between rf and the return of value-weighted market portfolio, SMB is size premium, HML is value premium, WML is momentum premium, S is sentiment measure, ε is common error, and β, s, h, w and δ are regression coefficients. The signs ***, ** and * indicate a significant relationship at the level of 1%, 5%, and 10%, respectively (N: 264).

Panel A. Sentiment – Stock Market Relationship without Control Variables

	Dependent Variable - STOXX 50 return	
Independent Variable - Change in Euro Area's Economic Sentiment Indicator Index (monthly)	Coefficient	t-value
	0.29	1.61
	Dependent Variable - DAX return	
Independent Variable - Change in Euro Area's Economic Sentiment Indicator Index (monthly)	Coefficient	t-value
	0.41	2.1**

Panel B. Sentiment – Stock Market Relationship with Control Variables

	Dependent Variable - STOXX 50 (t)	
Independent Variable - Change in Euro Area's Economic Sentiment Indicators (monthly)	Coefficient	t-value
	0.28	1.43
	Dependent Variable - DAX (t)	
Independent Variable - Change in Euro Area's Economic Sentiment Indicators (monthly)	Coefficient	t-value
	0.33	1.52

Ri is return of STOXX 50 and DAX indices, rf is risk-free rate, Rm – rf is the difference between rf and the return of value-weighted market portfolio, SMB is size premium, HML is value premium, WML is momentum premium, S is sentiment measure, ε is common error, and β, s, h and δ are regression coefficients.

Table 4.6 indicates no significant relationship between the Euro Area's economic sentiment indicator and market indices when control variables are used.

4.3.3 Germany

German stock index DAX will be used as a proxy for the German stock market in this study. Economic sentiment indicators of Germany are obtained from the European Commission[18]. Figure 4.4 illustrates DAX and the economic sentiment indicator.

Table 4.7 suggests there is evidence for a sentiment and stock return relationship. Both contemporaneous and subsequent returns are related to sentiment indicator. This means that one may buy stocks considering sentiment announcements in Germany.

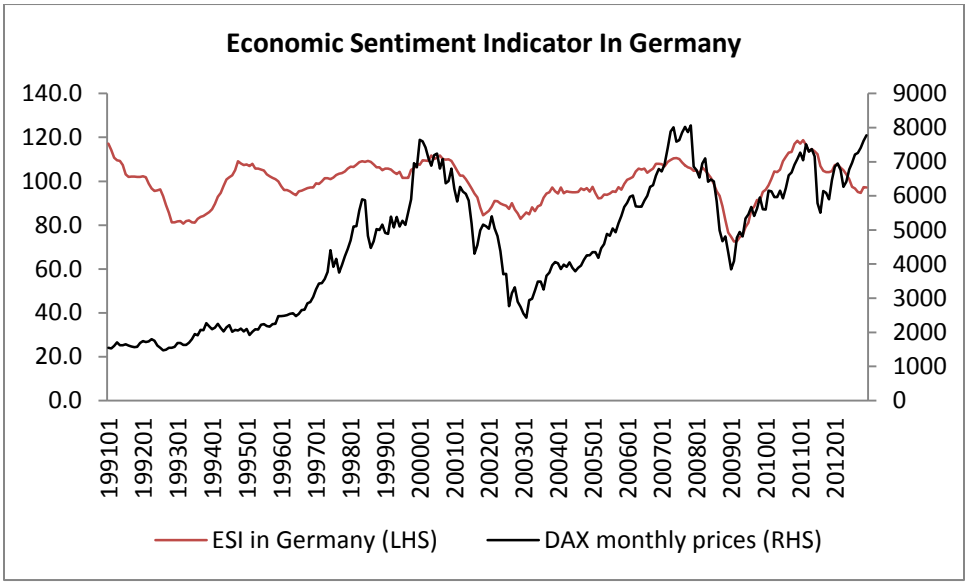

Figure 4.4 Economic Sentiment Indicator and DAX Index

[18] http://ec.europa.eu/economy_finance/db_indicators/surveys/index_en.htm

Table 4.7 Germany's Sentiment Indicator and DAX Index's Monthly Return (N: 264)

	Dependent Variable - DAX (t) monthly return	
Independent Variable - Change in Germany's Economic Sentiment Indicators (monthly) (t)	Coefficient	t-value
	0.47	2.44**
Independent Variable - Change in Germany's Economic Sentiment Indicators (monthly) (t-1)	Coefficient	t-value
	0.6	3.2***

4.3.4 UK

FTSE 100 index consists of 100 stocks from the London Stock Exchange and it will serve as the proxy for the UK market. The economic sentiment indicator of the UK is obtained from the European Commission. Figure 4.5 illustrates the FTSE 100 index and the UK's sentiment indicator.

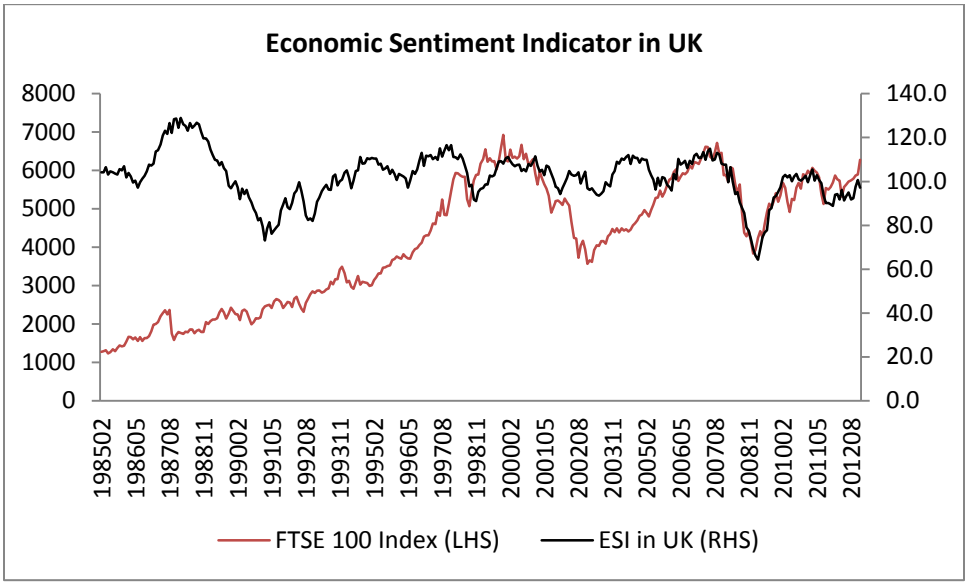

Figure 4.5 Economic Sentiment Indicator in UK and FTSE 100 Index

Table 4.8 UK's Sentiment Indicator and FTSE 100 Index's Monthly Return (N: 336)

	Dependent Variable - FTSE (t) monthly return	
Independent Variable - Change in UK's Economic Sentiment Indicators (monthly) (t)	Coefficient	t-value
	0.07	0.9
Independent Variable - Change in UK's Economic Sentiment Indicators (monthly) (t-1)	Coefficient	t-value
	-0.02	-0.23

Table 4.8 indicates there is no contemporaneous or subsequent relationship between the UK's economic sentiment indicator and the FTSE 100 index.

4.3.5 Emerging Countries

In this section, three emerging countries, Turkey, Taiwan and China, will be examined in terms of a sentiment and stock return relationship.

4.3.5.1 Turkey

Consumer Confidence Index[19] of Turkey is released monthly by the Turkish Statistical Institute. Respondents are asked to share their opinions about improvements in the household's financial position, employment, economic conditions, and the likelihood of saving for the next 12 months. The respondents are surveyed in the first 15 days of each month.

XU100 index, which consists of 100 stocks, is used as the proxy for the Istanbul Stock Exchange (Borsa Istanbul)[20]. In this analysis, the Consumer Confidence Index is compared with the XU100 index.

[19] Confidence index data and information is available at http://www.turkstat.gov.tr/Start.do
[20] XU100 (BIST 100) data is available at http://borsaistanbul.com/en/

Table 4.9 indicates that change in consumer confidence index of Turkey is significantly correlated to the XU100 index. Thus, international evidence exists for a sentiment and stock return relationship in Turkey. Figure 4.6 illustrates the Turkey's Consumer Confidence and XU100 index.

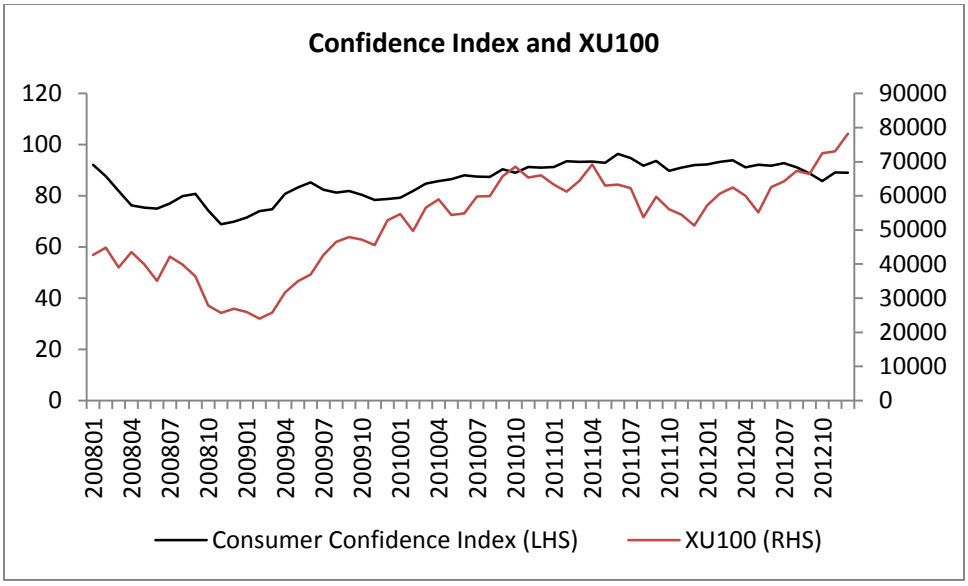

Figure 4.6 Consumer Confidence Index and XU100 prices

Table 4.9 Correlation between Confidence Index and Stock Market in Turkey (N: 60)

	Dependent Variable - XU100		
Independent Variable - Change in Consumer Confidence Index (monthly)	Coefficient	t-value	Adjusted R
	1.039	2.68***	0.095

4.3.5.2 Taiwan

The Taiwan Stock Exchange Weighted Index (TSEC)[21] will be used as a proxy for their stock market. The Consumer Confidence Index[22] of Taiwan is shared monthly with

[21] Monthly prices are obtained from http://finance.yahoo.com/

the investor community, and has 6 components: prices, household financial situation, employment, business and willingness to buy durable goods. Figure 4.7 illustrates both indices.

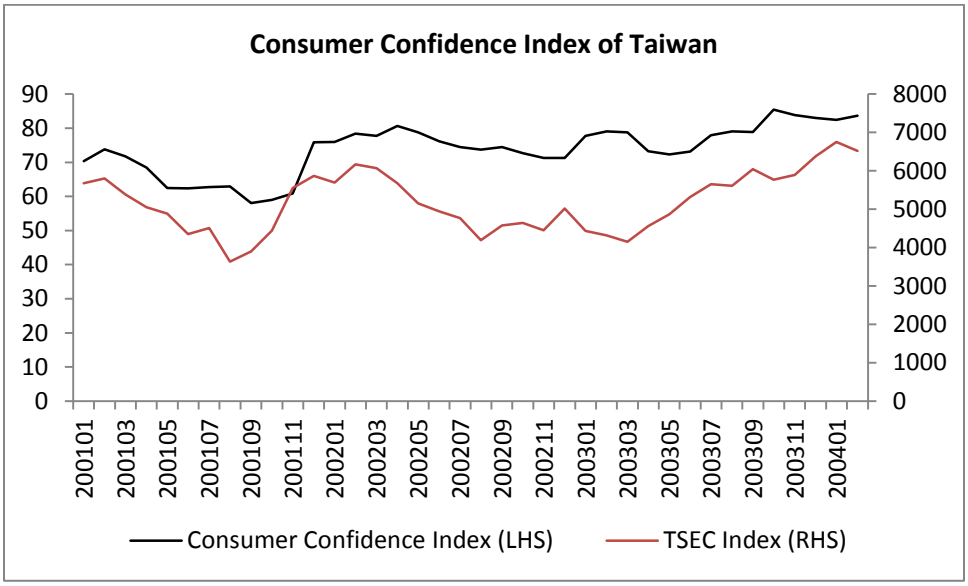

Figure 4.7 Sentiment Indicator and Stock Market Index in Taiwan

Table 4.10 Correlation between Confidence Index and Stock Market in Taiwan (N: 38)

	TSEC Index (t)
	Correlation Coefficient
Change in Consumer Confidence (t)	0.0748
Change in Consumer Confidence (t-1)	-0.0794

According to the table 4.10, there is no significant relationship between Taiwan's consumer confidence index and the TSEC index. This comparison was produces by using data between 2001 and 2004 due to the lack of confidence index data in English. More recent data is obtained from Taiwan Research Institute's website[23] and translated. The

[22] Data and information about confidence index is available at http://rcted.ncu.edu.tw/e_intro.phtml
[23] Consumer Confidence Index data is available in Chinese at http://www.tri.org.tw/

recent 5-year data (2008, 2013) presents a very similar result (correlation coefficient: 0.075).

4.3.5.3 China

Three indices[24], which are the Consumer Confidence Index, Consumer Expectation Index, and Consumer Satisfaction Index, related to consumer sentiment are released each month by the National Bureau of Statistics of China. It is found that the Consumer Expectation and the Consumer Satisfaction Indices are not significantly correlated to each other (correlation coefficient: 0.31). The Shanghai Composite Index[25] is used as the proxy for the Chinese stock market. Figure 4.8 illustrates these three indices and the Shanghai composite index.

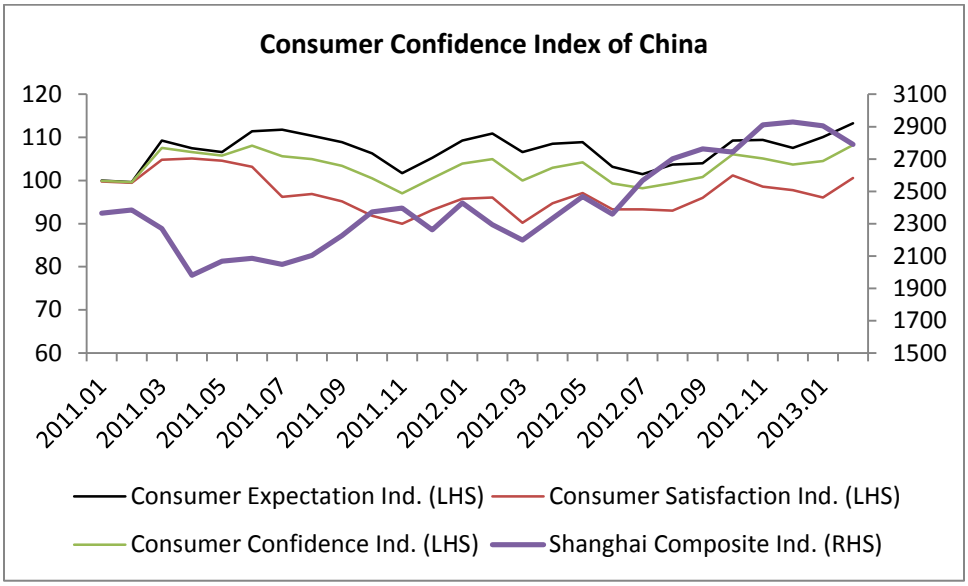

Figure 4.8 Confidence Index of China and Shanghai Composite Index

[24] Confidence index data is available at http://www.stats.gov.cn/english/statisticaldata/
[25] Index prices are available at www.wsj.com

Table 4.11 Correlation between Confidence Index and Stock Market in China

	Monthly Return of Shanghai Composite Index
Monthly Change in Indices	Correlation Coefficient
Consumer Expectation Index (t)	0.46**
Consumer Satisfaction Index (t)	0.22
Consumer Confidence Index (t)	0.40**
Consumer Expectation Index (t-1)	0.14
Consumer Satisfaction Index (t-1)	0.15
Consumer Confidence Index (t-1)	0.1

Unfortunately, the available sample size for the Consumer Confidence Index of China is limited (sample size: 25). The analysis performed with the available data suggests that changes in consumer expectation index as well as changes in consumer confidence index have a significant relationship with the Shanghai Composite Index.

4.4 Is Sentiment Global?

The previous sections indicated that local (country) sentiment indicators have the power to explain stock returns. Since the world is economically connected, one may wonder whether countries' sentiment indicators are correlated.

Table 4.12 shows the sentiment indicators of Taiwan, Japan, Euro area, UK, France, Germany, Turkey and US are significantly correlated at a 1% level from 2008 and 2012.

However, the table also indicates from 1985 to 1990, the relationships were not as significant as they were from 2008 to 2012; with the exception of the France and the US sentiment relationship (only five countries were used due to limited data). This increase in sentiment correlation may be due to advancements in online trading, since

online trading started in 1994 in the US[26]. Additionally, online media and increased economic relationships among countries may be other potential reasons.

Since there are correlations among countries' sentiment indicators, similar correlations can exist among countries' stock returns as well. As shown in table 4.13, with the exception of the UK and US stock markets (S&P 500 and FTSE 100 indices), stock market indices are significantly correlated at least at the 10% level.

In conclusion, there is a global sentiment based on the evidence, and it is partly valid in many countries. In addition, global sentiment is likely becoming stronger with the help of online trading, online media, and development of economic relations. In recent years, global stock markets do not have the same boundaries counties have.

[26] https://www.tdameritrade.com/about-us.page

Table 4.12 Relationships among Countries' Sentiment Indicators

Panel A shares the correlation coefficient among countries' sentiment indicators. All coefficients are significantly correlated at the 1% level. Monthly values of years between 2008 and 2012 (N: 60) are used. Panel B shares the correlation coefficient between countries' sentiment indicators in the years between 1985 and 1990 (N: 72). Only five sentiment indicators are used due to limited data.

Panel A: Relationship between 2008 and 2012

	T	J	E	UK	F	G	Tur	US
Taiwan	1							
Japan	0.66	1						
Eurozone	0.76	0.50	1					
UK	0.74	0.67	0.90	1				
France	0.69	0.40	0.98	0.87	1			
German	0.89	0.56	0.96	0.87	0.91	1		
Turkey	0.82	0.80	0.70	0.72	0.64	0.75	1	
US	0.46	0.47	0.53	0.66	0.52	0.57	0.52	1

Panel B. Relationship between 1985 and 1990

	Euro area	UK	France	German	US
Euro area	1	-0.07671	0.906875	0.833367	0.44005
UK		1	0.283	-0.553	0.594
France			1	0.554767	0.682267
German				1	-0.04307
US					1

Table 4.13 Relationships among Countries' Stock Indices (2008 – 2012)

Table shares the correlation coefficients among countries' stock indices (N: 60). Stock market indices used: NIKKEI 25 Index for Japan, S&P 500 Index for the US, STOXX 50 Index for the Euro area, DAX is for Germany, FTSE 100 index for UK, CAC 40 Index for France, and STEC Index for Taiwan.

	J	US	E	G	UK	F	T
Japan	1	0.220857	0.722144	0.724129	0.717565	0.718122	0.635097
US		1	0.282134	0.378557	0.196843	0.265878	0.127712
Euro area			1	0.93017	0.889103	0.980618	0.689432
Germany				1	0.831368	0.901425	0.690791
UK					1	0.904063	0.705869
France						1	0.708645
Taiwan							1

4.5 Is the Impact of Sentiment the Same on all Sector and Size Portfolios

Section 4.2 presents evidence of sentiment and the S&P 500 index relationship. Thus, one may conclude that sentiment has impact on stock returns in the US market. However, the S&P 500 index consists of 500 large stocks from leading industries. Therefore, it is not known that sentiment has similar impact on all size and industry portfolios.

Table 4.14 indicates that small stocks have significant relationship with sentiment. This finding is in line with Baker & Wurgler's (2006) paper.

Baker & Wurgler (2006) stated that the impact of investor sentiment is bigger on stocks which are hard to arbitrage. In other words, they claimed that stocks with some specific characteristics behave in line with the sentiment. I wondered whether the impact of investor sentiment varies on different industries. To be able to answer this

question, a multi variable regression (below) is performed for 22 different industry portfolios[27].

$$R_t - rf_t = \alpha + \beta\,(Rm - rf)_t + s(SMB)_t + h(HML)_t + \delta\,(S)_{t-1}$$

S is Baker & Wurgler's (2006) investor sentiment index. Its previous value is regressed with the excess return of 22 portfolios along with the market (Rm – rf), size (SMB) and value premium (HML) of Fama & French (1996).

Table 4.14 Sentiment Indicators and Size Portfolios

Table presents the results of regression between different size portfolios and sentiment indicator. Small is S&P Small-Cap 600 Index (N: 179), Middle is S&P Mid-Cap 400 Index (N: 232) and Large is S&P 500 index (N: 395). The signs ***, ** and * indicate significant relationship at the level of 1%, 5% and 10%, respectively.

	Small	**Middle**	**Large**
Sentiment Indicators	t-value	t-value	t-value
Change in Michigan Index	3.50***	-0.089	-0.53
Change in Conference Board Index	5.09***	0.32	0.13
Change in Baker and Wurgler's Index	4.31***	1.05	0.19

Table 4.15 indicates that very few industries are related to investor sentiment index of Baker & Wurgler (2006). For example, when sentiment is high, the portfolio consists of stocks from the food products industry have high return in the following month. However, the steel industry has the opposite relationship.

In conclusion, it is seen that the impact of investor sentiment is not same for all size and industry portfolios. Small stocks (in terms of market cap) have significant relationship with the sentiment; however, the majority of industry portfolios are not correlated with Baker & Wurgler's (2006) investor sentiment index.

[27] Data is available at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Table 4.15 The Impact of Investor Sentiment on Various Industries

Table presents the relationship between Baker & Wurgler's (2006) sentiment index and 22 different industry portfolios. Multi-variable regression equation is: $R_t - rf_t = \alpha + \beta\ (Rm - rf)_t + s(SMB)_t + h(HML)_t + \delta\ (S)_{t-1}$. S is Baker & Wurgler's (2006) investor sentiment index. Its previous value (t-1) is regressed with the excess return of 22 portfolios along with the market (Rm – rf), size (SMB) and value premium (HML) of Fama & French (1996). The signs ***, ** and * indicate significant relationship at the levels of 1%, 5% and 10%, respectively (N: 396).

Industry	**tstat**	**Industry**	**tstat**
Food Products	2.11**	Steel	-1.72*
Beer	0.36	Fabricated Products	-0.64
Tobacco Products	0.85	Electrical Equipment	-0.41
Games	0.27	Automobiles and Trucks	0.52
Books	2.2**	Carry	-0.8
Consumer Goods	1.61	Mines	-1.62
Apparel	0.39	Coal	-0.75
Healthcare	0.95	Oil	-1.11
Chemicals	-0.34	Utilities	-0.08
Textiles	0.45	Communication	0.28
Construction	0.4	Services	0.74

4.6 Conclusion

In this chapter, the relationship between sentiment indicators and stock returns are examined. It has been found that several sentiment indicators, the Gallup Economic Outlook, the State Street Investor Confidence Index, the American Association of

Individual Investors Sentiment Survey, and Baker & Wurgler's (2006) investor sentiment index are correlated with the S&P 500 index returns. In other words, both institutional and individual sentiment indicators are related to the S&P 500 index. Nevertheless, small stocks and some industries are more inclined to sentiment changes.

Additionally, there is evidence of sentiment and stock relationship in Japan, Germany, Turkey and China. With these findings it can be concluded that sentiment and stock return relationship is international.

Finally, it is also found there is significant correlation among local (country) sentiment indicators. These correlations are stronger from 2008 to 2012 than 1985 to 1990. In addition, local stock market indices are positively correlated as well.

CHAPTER 5. SENTIMENT AND ANOMALIES

As explained in chapter 2, anomalies are deviations from market efficiency. Asset pricing models of Classical Finance Theory are not able to explain these deviations. The literature suggests that limits to arbitrage and behavioral biases are the reasons for anomalies (see chapter 2). This chapter examines whether there is a relationship between investor sentiment and market anomalies.

5.1 Can Sentiment Explain Anomalies?

Stambaugh et al. (2012) found that sentiment has a positive impact on subsequent returns of anomalies. Stambaugh et al. (2012) used a predictive regression to assess the effect of sentiment indicators on anomalies in the subsequent month. In this thesis, five anomalies, which are size, BM (book-to-market), momentum, short-term and long-term reversals are analyzed in terms of their relationship with sentiment indicators. The return data of anomaly strategies and Fama & French (1996) factors are obtained from French's data library[28].

In this study, first, monthly returns of long-short strategies are calculated. For example, size anomaly claims on average small stocks have higher risk adjusted returns than larger stocks. To take advantage of this difference, size strategy longs (buy) the small stocks and shorts (sell) the large stocks. French's website presents 10 portfolios (called deciles since the number of stocks in each portfolio is equal) which is formed on the basis of various anomaly strategies. Again in size anomaly case, the return of portfolio 1 (portfolio consists of smallest stocks) minus the return of portfolio 10

[28] Data is available at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

(portfolio consists of largest stocks) gives the return of long-short size strategy. Other strategies are calculated in a similar way. For example, portfolios of momentum strategy are formed based on their previous return from two months to twelve months (-12, -2). Decile 10 represents the portfolio which had the highest previous return. Thus, long-short momentum strategy is calculated by subtracting decile 1 from decile 10 since it aims to form a portfolio that previously did well.

After all long-short strategies' returns are calculated, simple and multiple regression analyses are performed. Panel A of table 5.1 shows the results of simple regression between anomalies and change in the University of Michigan consumer sentiment index. It is found that BM (book-to-market), momentum, and short-term and long-term reversal strategies are correlated with the Michigan Index. It seems that BM anomaly works better when there is positive change in sentiment. However, when there is an increase in the Michigan Sentiment Index, momentum strategy goes down. Additionally, short-term and long term reversal strategies are positively correlated with the sentiment changes.

One may assert that control variables should be used to assess the real impact of sentiment on anomalies. To answer this question, panel B of table 5.1 is prepared with the control variables. When control variables are added, sentiment's impact on reversals disappears but its impact on size shows up. Panel B suggests that when sentiment increases, size strategy's performance diminishes.

Baker & Wurgler's (2006) investor sentiment is also used in this case to reveal the relationship between sentiment and anomalies. Table 5.2 suggests that Baker & Wurgler's (2006) index's impact on size and BM is similar with the Michigan Index's impact; however, there is no correlation between sentiment and momentum strategy when Baker and Wurgler's index is used.

Table 5.1 Change in Michigan Index and Anomalies

Panel A presents t-values of the regression $R_t = \alpha + \delta (\Delta S)_t + \varepsilon$ where R_t is excess return of long-short anomaly strategies. Change in the University of Michigan Consumer Sentiment Index is used for the comparison. Panel B presents t-values of the regression $R_t = \alpha + \beta (Rm - rf)_t + s(SMB)_t + h(HML)_t + \delta (\Delta S)_t$ where R_t is excess return of long-short anomaly strategies. The signs ***, ** and * indicate significant relationship at the level of 1%, 5% and 10%, respectively (N: 395).

Panel A. Change in Michigan Index and Anomaly Strategies' Monthly Returns

	Change in Michigan Index	
Anomaly Strategies' Monthly Returns	**Parameter Estimate**	**t-value**
Size	-0.06312	-1.22
BM	0.16375	3.51***
Momentum	-0.22327	-2.92***
Short-Term Reversal	0.10962	1.9*
Long Term Reversal	0.08117	1.68*

Panel B. Change in Michigan Index and Anomalies with Control Variables

	Change in Michigan Index	
Anomaly Strategies' Monthly Returns	**Parameter Estimate**	**t-value**
Size	-0.08454	-1.78*
BM	0.06598	2.57 **
Momentum	-0.21513	-2.79***
Short-Term Reversal	0.07718	1.31
Long Term Reversal	-0.03962	-0.97

Predictive regression at table 5.3 suggests that when sentiment is high, the return of the size anomaly will go down in the next month. Additionally, it is found momentum and sentiment has a positive subsequent relationship. In other words, momentum strategy works well following a month of high sentiment.

Table 5.2 Change in Baker and Wurgler's Index and Anomalies

Table presents t-values of the regression $R_t = \alpha + \beta\,(Rm - rf)_t + s(SMB)_t + h(HML)_t + \delta\,(\Delta S)_t$ where ΔS is change in Baker and Wurgler's investor sentiment index. R_t is the excess return of long-short strategies. The signs ***, ** and * indicate significant relationship at the level of 1%, 5% and 10%, respectively (N: 395).

	Change in Baker and Wurgler Index	
Anomaly Strategies' Monthly Returns	**Parameter Estimate**	**t-value**
Size	-0.00592	-2.26**
BM	0.00401	2.84***
Momentum	-0.00476	-1.11
Short-Term Reversal	0.00056627	0.17
Long Term Reversal	-0.00316	-1.40

Table 5.3 Michigan Index and Subsequent Return of Anomalies

$R_t = \alpha + \beta\,(Rm - rf)_t + s(SMB)_t + h(HML)_t + \delta\,(\Delta S)_{t-1}$ where R_t is excess return of long-short anomaly strategies and ΔS is the change in the University of Michigan consumer sentiment index is used for the comparison. The signs ***, ** and * indicate significant relationship at the level of 1%, 5% and 10%, respectively (N: 395).

	Michigan Index Level (t-1)	
Anomaly Strategies' Monthly Returns (t)	**Parameter Estimate**	**t-value**
Size	-0.00030565	-1.71*
BM	-0.00009365	-0.96
Momentum	0.00058416	2.00**
Short-Term Reversal	-0.00001234	-0.06
Long Term Reversal	-0.00017474	-1.14

Apart from these five different anomalies, January effect is another anomaly mentioned in the literature. It is found the return of small stocks are higher in January

on average ((Keim, 1983), (Reinganum, 1983)), and it is termed as “January Effect” in finance literature. It is wondered whether sentiment can have impact on this anomaly as well. Figure 6.1 shows Michigan Consumer Sentiment indicator is lower than average in December. Chapter 4 showed change in the Michigan Index and small stocks are significantly correlated (t-value: 3.5). Therefore, the significant increase in sentiment in January (see Figure 5.1) might be another reason of January Effect. Furthermore, it is worth nothing that BM and short-term and long-term reversals strategies work better in January as size strategy does (see Figure 5.2).

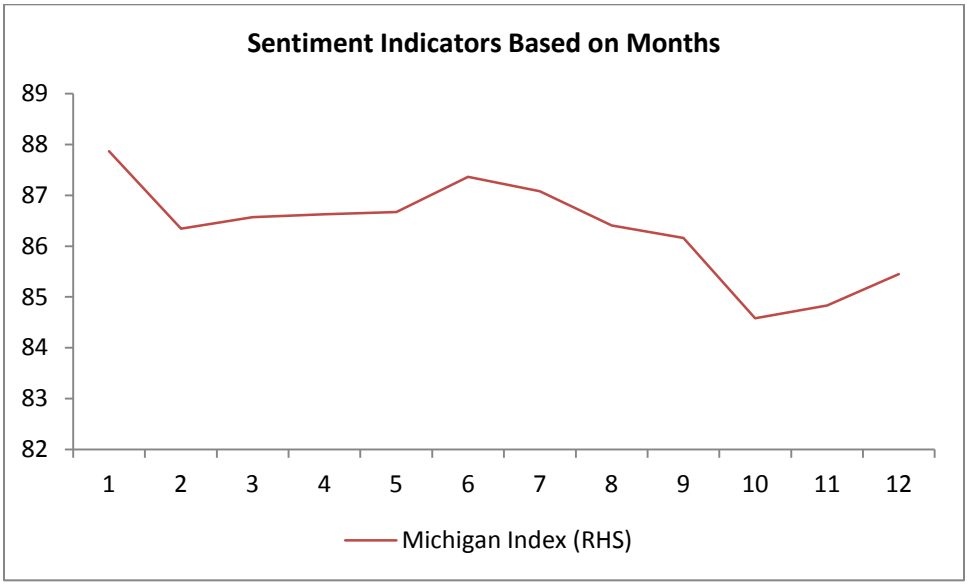

Figure 5.1 The Average of Sentiment Indicators in 12-months

The figure 5.1 illustrates the average levels of the University of Michigan Consumer Sentiment Index from January to December (1 represents January and 12 represents December) and average monthly values from 1979 to 2010

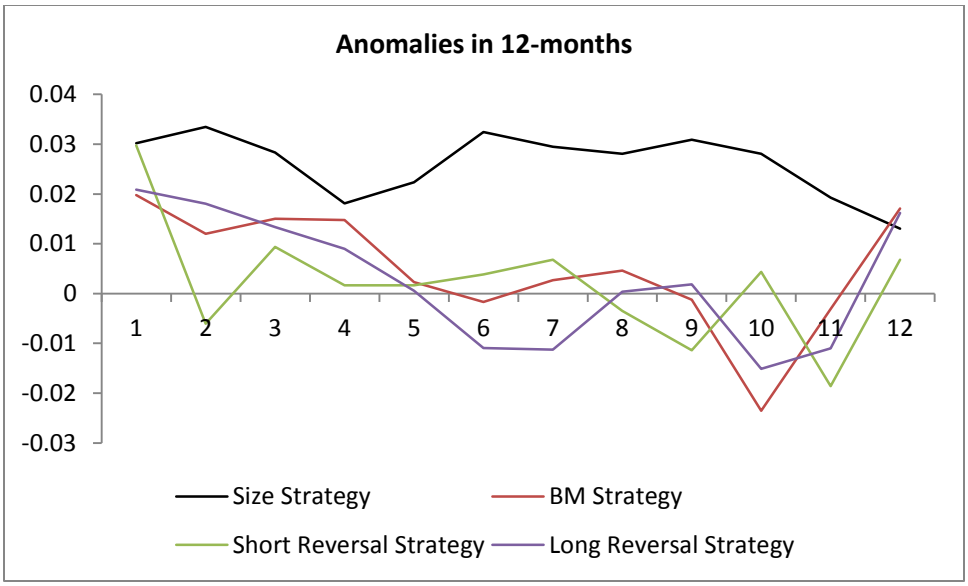

Figure 5.2 Average Return of Anomaly Strategies in 12 months

The figure 5.2 illustrates the average return of strategies from January to December (1 represents January and 12 represents December) and average monthly values from 1979 to 2010

5.2 Conclusion

Other than limits to arbitrage and behavioral biases, it seems that investor sentiment also has impact on anomalies. There is evidence size, book-to market, and momentum strategies are correlated with the sentiment. Additionally, the January Effect may be explained by sentiment.

CHAPTER 6. SENTIMENT RATINGS OF INDIVIDUAL STOCKS

The previous chapters showed investor sentiment has impact on stock returns. For example, there is a subsequent relationship between the State Street Investor Confidence Survey and S&P 500 index returns. In other words, when sentiment is high (low), stock returns will be high (low) in the next month. Therefore, one can use sentiment information during the trading process and make a profit. However, each stock has different sensitivity to sentiment changes. Stocks with some specific characteristics are more inclined to sentiment changes (Baker & Wurgler, 2006). For example, chapter 4 presents evidence that size and industry may be a proxy for the sentiment sensitivities. Therefore, one needs to know the behavior of an individual stock under sentiment changes when buying or selling that specific stock.

Unfortunately, papers related to investor sentiment cannot help an investor evaluate an individual stocks' behavior. Baker & Wurgler (2006) stated that … *"when beginning-of-period proxies for sentiment are low, subsequent returns are relatively high for small stocks, young stocks, high volatility stocks, un- profitable stocks, non-dividend-paying stocks, extreme growth stocks, and distressed stocks."* Seven criteria or more (there may be other criteria such as institutional ownership) need to be considered at the same time to evaluate a stock's sensitivity to the sentiment changes. It is quite a difficult process for an average investor.

In this chapter, we will try to help investors understand the behavior of a specific stock so they will be able to use sentiment information during the trading process.

6.1 Method

Companies are ranked based on several characteristics such as financial stability and ability to pay back loans by rating companies such as Standard and Poor's, Fitch, and Moody's. Investors use ranking information of a stock as an indicator and invest accordingly. A similar rating system that represents stocks' sentiment sensitivities can be used to take advantage of sentiment information. This rating information may not help in an efficient market where there is very limited mispricing. However, as stated in this study, there are sentiment-driven patterns and anomalies in stock markets. Therefore, knowing the behavior of a stock under sentiment changes may help investors to make better investment decisions. This objective can be achieved by constructing a rating system, which reflects stocks' sensitivity to sentiment changes.

In order to understand an individual stocks' tendency to sentiment changes, sentiment changes are regressed with excess return of individual stocks by using Fama & French's (1996) three factors as control variables.

$$R_{it} = \alpha_i + \beta_i(Rm - rf)_t + s_i(SMB)_t + h_i(HML)_t + \delta_i(\Delta S)_t$$

ΔS is change the in Baker & Wurgler's (2006) orthogonalized investor sentiment index. R_t is the excess return of individual stocks. SMB is size premium, HML is value premium and Rm – rf is market premium. Monthly stock returns are obtained from Wharton Data Research Library[29] (WRDS), sentiment changes are from Wurgler's website[30], and control variables are from French's data library[31]. The regression model is run for 2282 individual stocks. Since the model is stock level, it is run 2282 times. In other words, 2282 coefficients are obtained for each independent variable. Five years data is used for the regression (2004-2009). Since it is monthly data, a sample size is 60 for each regression.

[29] https://wrds-web.wharton.upenn.edu/wrds/
[30] http://people.stern.nyu.edu/jwurgler/
[31] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

δ_i coefficient shows the direction of the relationship between an individual stock and sentiment changes. A positive δ_i coefficient means sentiment changes affect stock returns positively. The larger amount of δ_i coefficient means sentiment changes have stronger impact on corresponding stock.

δ_i coefficients are obtained for each individual stock. These 2282 stocks are separated into ten groups as in Berger & Turtle (2012). Stocks with a negative δ_i coefficient are classified as the first group (decile 1). Stocks with positive coefficients are classified into nine equal-sized groups based on the size of δ_i coefficient. Decile 10 has the stocks with the highest δ_i coefficient while decile 2 has the stocks with lowest positive δ_i coefficient.

Table 6.1 shows the deciles and corresponding ratings. If an individual stock is in decile 10, it means that the stock tends to behave in line with sentiment changes. Since unexpected macroeconomic and political news can negatively affect investor sentiment, stocks in decile 10 can have unexpected negative returns. Because of this reason, a C rating is assigned to stocks in decile 10. However, stocks that are not inclined to sentiment changes have AAA rating since they are not vulnerable to unexpected changes in the market and economy. Furthermore, since sentiment prone stocks frequently deviate from expected prices, predicting their returns becomes more difficult.

Berger & Turtle (2012) allocated deciles with a similar method and investigated the common characteristics of deciles. However, they assigned all stocks with negative δ_i coefficient into one decile (decile 1), which includes 45% of all stocks in our study; thus, they could not observe any differences among stocks with negative coefficients. One may wonder the differences among stocks with negative coefficients so this chapter investigates decile 1.

For this purpose, decile 1 is classified into six groups (ratings). Table 6.2 shares negative sentiment ratings. M6 is the group with the most negative δ_i coefficients.

The first question is whether there are differences in terms of riskiness among negative ratings. To observe the riskiness, the performance of stocks with negative ratings can be observed in recession times. Risky stocks are expected to have more

negative returns. Also, spread portfolio (M6 – M1) may have positive returns in recession periods since M6 would behave against decreasing sentiment in recession periods. The period from December 2007 to June 2009 is used for this comparison since it is accepted as recession period in the US economy[32].

Table 6.1 Positive Sentiment Ratings

Positive Sentiment Ratings	
Decile 2 (low)	AAA
Decile 3	AA
Decile 4	A
Decile 5	BBB
Decile 6	BB
Decile 7	B
Decile 8	CCC
Decile 9	CC
Decile 10 (high)	C

Table 6.2 Negative Sentiment Ratings

Negative Sentiment Ratings (Decile 1)
M1 (close to zero)
M2
M3
M4
M5
M6 (the most negative)

[32] http://www.nber.org/cycles.html

The second question is whether stocks with a different negative rating have common characteristics such as size and book-to-market ratio.

6.2 Results

δ_i coefficients are obtained for 2282 stocks and classifications are made accordingly. For example, according to the rating classifications, Microsoft's (MSFT) and AT&T's (T) ratings are AA while DELL's rating is BBB. At this point, an investor may think that Microsoft and AT&T are not affected by the sentiment so that buying these stocks during uncertain economic conditions might be a good idea. Additionally, these stocks will not be affected by sentiment driven mispricing.

Table 6.3 Monthly Average Return Differences among Deciles

	Return	t-stat	CAPM α	t-stat
Decile 2	0.007508	1.04	0.00081	0.118
Decile 10	0.007218	0.46	-0.00512	-0.342
Decile 1	0.005676	0.75	-0.0007	-0.095
10 – 2	-0.00029	-0.027	-0.0059	-0.563
10 – 1	0.00154	0.1276	-0.0044	-0.3742

Even though common characteristics and return differences of ten deciles are examined by Berger & Turtle (2012), I examined the average return differences among these ten deciles between the years of 2004 and 2009. No significant return difference is found among deciles.

The minimum and maximum values of change in Baker and Wurgler's orthogonalized sentiment index are -0.3527 and 4.367, respectively, from 1978 to 2010. The average δ_i coefficient of M6 group is -0.03. Since change in the index's value interval is narrow and even the most negative group's coefficient is quite small, one may not expect significant return differences among groups with negative coefficients.

Table 6.4 Characteristics of Negative Ratings

Return stands for average monthly return during the recession period (December 2007 – June 2009). Size is average market capitalization of rating groups. For size, numbers are in million and rounded to the closest million. B/M ratio stands for average book-to-market ratio of rating groups.

	M6	**M5**	**M4**	**M3**	**M2**	**M1**	**M6-M1**
Return	-0.28%	-0.57%	-0.82%	-0.90%	-0.79%	-0.88%	0.60%
Size	1343	3332	6468	8320	10062	5103	-3761
B/M Ratio	89.8%	68.7%	73.3%	64.2%	60.9%	75.3%	14.4%

The spread portfolio, M6-M1, has a positive average return during the recession as expected; however, it is not significant (t-value: 0.42). It seems that M6 has the smallest stocks among negative ratings and size becomes larger from M6 to M1. Berger & Turtle (2012) stated that size becomes smaller from decile 2 to decile 10. Thus, we may conclude that stocks that are not related to sentiment (positive or negative) have the largest size.

CHAPTER 7. CONCLUSION

7.1 Results

The results of this study suggest that investor sentiment indicators, especially direct indicators, are correlated. In addition, institutional and individual investor sentiment indicators are not significantly related, and it seems that individual and institutional investors have different level of expectations for the market.

It is indicated that some investor sentiment indicators such as the State Street investor confidence survey, the American Association of Individual Investors Sentiment Survey and Baker and Wurgler's investor sentiment index, are correlated with monthly S&P 500 index returns. A similar relationship is found in other countries as well. Sentiment indicators and stock market indices are significantly correlated in Japan, Germany, Turkey and China. These findings indicate that sentiment-stock market relationship is valid not only in the US market but also in other markets.

Currently, financial reports mention the impact of the US market on different countries and vice versa. This kind of news makes me think of the existence of a global sentiment. A global sentiment may have an impact on several markets related to each other with economic ties. In other words, there can be a significant relationship among local sentiment indicators. Test results suggest all local sentiment indicators are significantly correlated. In addition, since local sentiment indicators are correlated, local stock market indices are correlated as well. Sub-period analysis suggests that the significance of this relationship has increased after the proliferation of online international trading and online media. Moreover, stronger economic ties have an impact. As a result, one may invest in many countries by considering global sentiment information.

The impact of sentiment is tested on different size and sector portfolios. The results suggest sentiment has a significant impact on small cap portfolios, and when sentiment is high, the subsequent returns of food products and book industries are high. Thus, investors should consider this finding while investing.

Anomalies are one of the most discussed topics in finance literature. So far limits to arbitrage and psychology have been considered reasons for anomalies. This study examined whether sentiment can explain anomalies. The results state sentiment can explain size, book-to-market, and momentum anomalies. Therefore, it can be concluded that investors' expectations and feelings cause deviations from the correct prices.

Up to this point, the results of this study suggest sentiment has strong impact on stock returns. Several indicators have the power to predict the subsequent stock returns. Therefore, investors can earn positive returns by using sentiment information. However, one needs to consider seven or more different criteria to assess the behavior of a stock under sentiment changes. To make this process easier, a model is run and stocks are classified into ratings categories based on their behaviors under sentiment changes. With this rating information, an average investor can understand an individual stock's behavior and invest accordingly to yield positive returns without taking more risk. Additionally, it is found stocks that are negatively correlated have different average returns in recession time and size.

In conclusion, the results suggest that sentiment has a role in stock returns. In addition, it may predict stock returns and explain anomalies; however, an important point should be addressed before concluding this study. Sentiment indicators may include or reflect macroeconomic factors as well. Therefore, another reason of the sentiment and stock return relationship might be these macroeconomic factors. In this study, other than Baker & Wurgler's (2006) orthogonalized sentiment index, all indicators may reflect macroeconomic factors. Even Baker & Wurgler's (2006) orthogonalized sentiment index, in which six different macroeconomic factors are eliminated, may contain some other macroeconomic factors. Considering this risk,

Stambaugh et al. (2012) also did similar elimination of macroeconomic factors for the University of Michigan Index. As a result, one should be aware of such risk.

7.2 Future Research

This study finds that investor sentiment indicators have a significant impact on small cap portfolios. This may be because of having low institutional ownership. Therefore, the impact of institutional ownership should be examined in future research.

In addition, the impact of sentiment should be analyzed in more countries. The relationship between sentiment and stock returns may be stronger in emerging countries due to lack of institutional investors.

The results of this study indicate that there might be a global sentiment which has an impact on stock returns all over the world. In order to analyze and address te global impact of investor sentiment, a global sentiment index can be created by considering several direct sentiment indicators. Baker et al., (2012) have conducted a similar study by using indirect sentiment indicators of six countries: US, Canada, France, UK, Germany and Japan. After creating the global sentiment index, its impact on different stock markets can be examined.

In addition, the relationship between sentiment and other type of anomalies should be investigated.

Moreover, the ratings can be formed using a longer time period. Different characteristics can be examined among deciles and negative ratings.

Finally, since sentiment indicators may contain or reflect macroeconomic factors, these factors can be eliminated before examining the relationship between sentiment indicators and stock returns.

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